THE
ELECTRICAL REVIEW

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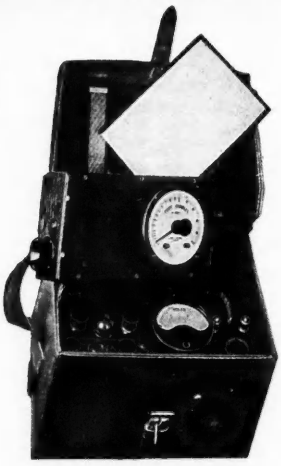

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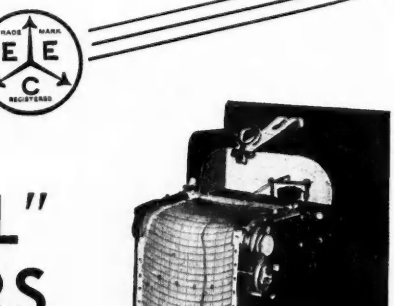

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Electrical Export Trade

British Manufacturers Ready and Able to Serve

IN peacetime this country, like Germany, has to export to live. In wartime, in the face of many handicaps, the need is even more vital, for many factors which help to right the adverse "visible" foreign trade balance which is a feature of our economy are put out of action. Again, the immense credits which were available from the United States during the last war are now withheld from us. Consequently to enable us to pay for our enormous requirements we have to secure foreign currency by the sale of manufactured goods in overseas countries.

Quite apart from this, to turn to our own industry, many leading manufacturing organisations rely largely upon export orders to keep their works going. It is imperative for them to maintain their links with overseas customers intact; if they break it may take years to repair them. We have to look beyond the war; it was short vision which created much of the havoc which ensued upon the 1914-19 conflict.

Usually the British Industries Fair provides an opportunity for laying particular emphasis upon export trade. Unfortunately circumstances have necessitated the cancelling of the Fair but we hope that this special issue will compensate to some extent for its loss.

Electrical manufacturers are fully alive to the situation and are willing and able to cultivate markets and secure orders. But they want to be certain, in advance, that when orders are obtained they will be able to deliver the goods within reasonable time—in fact their customers will naturally insist on it although they will make allowances.

The Competitive Position

It must not be forgotten that the disappearance of German competition has opened up opportunities for neutrals as well as for us. These neutrals are untrammelled by having to provide war materials, at least on such a scale as we have to. Our terms must therefore be as good as, or better than, theirs if we are to succeed in foreign markets. We can hope that our Dominions will exercise a wide measure of preference for British goods, but foreigners are not under the same moral obligation. The fact that we are purchasing large quantities of their primary products should, however, encourage both Dominion and foreign countries to look favourably upon British manufactured goods.

The matter of terms raises the knotty problem of tender prices; exporters must be able to quote firmly in the face of probable price increases. We feel that in its statement of its aims and plan of work the Export Council has not laid enough emphasis on this point. It hopes to examine suggestions upon many matters including, at the end of the list, "a number of points bearing upon the essentially practical problems of firm delivery dates and prices." These ought to have been put before such things as publicity and propaganda.

Balancing Requirements

The availability of material, labour and transport must also be assured to manufacturers. The last is a matter which is being satisfactorily dealt with. But materials and labour have to be shared between Service, export and home requirements. Nobody disputes that the national services must come first, but there is a divergence of views as to the relative importance of the other classes. The Government's view (again expressed by Mr. R. S. Hudson in this issue) is that the needs of the home consumer must be subordinated to the call for supplies for the export trade. This will be generally agreed, provided it does not mean the reduction of the home trade to a dangerous extent.

There must be some discrimination between the various kinds of industries. Some have built up an export trade on the solid foundation of the home demand which carries a substantial part of the overhead costs and enables competitive prices to be quoted abroad. The disappearance or too-drastic reduction of the home market in such a case will seriously undermine the manufacturers' exporting ability.

The other tasks of the industrial export groups which are being set up under the auspices of the Export Council are outlined in the White Paper published last week which is dealt with in this issue. So far as the electrical industry is concerned Mr. V. Watlington, Director of B.E.A.M.A., shows in his Article on page 299 that the situation is well in hand and developments may be expected very soon. Our overseas readers can be certain that British electrical manufacturers are willing and able to serve them during the war as in peacetime. They are confident of their ability to work out their own salvation.

Higher Voltage

WHILE 2,000-kVA or less is the greatest transformer capacity that should be used when stepping down to 400-V, having regard to the duties imposed on medium-voltage switchgear, other considerations are likely in future to reduce the ratio of 1 to 75, relating voltage to rupturing capacity. One of these was mentioned by Mr. C. J. O. Garrard at the I.E.E. last week in drawing attention to the possibility of metals becoming more difficult to obtain than insulation during the war and for some time after. It is not so much a matter of the dimensions of the circuit-breaker parts as the heavy copper connections required. The limitations thus imposed on lower-voltage switching will be no real disadvantage in the long run. Taking into account the greater flexibility and reserve of power thus obtainable, it may be regarded as axiomatic that when in doubt one should adopt the higher voltage.

De-Gaussing

COMMEMORATION of the achievements of scientists by naming after them the electrical and magnetic terms associated with their work is a well-established custom. It is to be hoped, however, that the derivation of verbs from them will not spread as a result of the latest success of the Admiralty. "Gauss" as a brief way of writing "the unit of magnetic force or the intensity of a magnetic field" is a respected member of the family of C.G.S. practical system of units. In view of the circumstances one ought not, we suppose, to quibble at the coining of the verb "to de-gauss" to describe the neutralising of the natural magnetic field of a steel ship so as to render it immune from damage by magnetic mines, but we hope the exceptional conditions will be borne in mind. There is, of course, much more than would be apparent to the general public in the brilliant investigations that have resulted in effective "de-gaussing."

E.D.A. Keeps at It

TO-DAY the British Electrical Development Association is holding its annual meeting, and we expect to hear that in spite of the war it is continuing to keep electricity well before the general public and particular sections of it. The latest example of popular advertising, a display appearing in the newspapers, puts over a good point—the advantage of the electric fire in the uncertain period between the end of winter and the beginning of spring. This is the time when the housewife looks forward to the discontinuance of coal fires but daren't let them go because of the chilly morn and dewy eve. As the advertisement points out, it is then that the easily-switched-on electric fire comes into its own. The supply of hot water is often linked up with this matter, and once again electricity, through the agency of the water heater, means small trouble and great economy. The Factory Lighting Campaign is going ahead all over the country, and good results are already being obtained.

An "Economy" Move

A FEW weeks ago the question of combining the Gas and Electricity Departments to a lesser or greater extent was aired at Bradford and Morecambe. A similar move is foreshadowed at Blackburn, where opinion is likely to be very evenly balanced, for in 1935 a scheme of this kind was defeated only by the Mayor's casting vote. Councillor R. F. Mottershead is reported to have stated last week that "both Departments produce the means for light and power, and great savings can be effected with one organisation to control supplies." On this point it is interesting to note the view stated at Greenock on the subject of joint meter readings that small savings might be made, but any idea of large economies could be dismissed. Mr. D. H. Bishop, the Dundee electrical engineer, points out that his Department is responsible for maintaining in a safe condition all meters, mains, etc., on consumers' premises, and he cannot pass the responsibility on to the City Collector's Department. Councillor Mottershead's arguments are (1) that something must be done to assist the Gas Department, and (2) the rates would benefit. Surely it is not in the town's interests that the further progress of its enterprising Electricity Department should be jeopardised because the Gas Department is not doing so well, or because, for a very good reason, it is laid down that the electricity reserve fund cannot be raided until it reaches a specified figure? It is quite likely that the Council would soon find that instead of having one undertaking reporting a loss both would be insecure.

Switchgear Rating

A method of rating switchgear that is based on its MVA breaking capacity has the disadvantage not only of obscuring the merits of such achievements as the design of medium-voltage air-break switchgear which was described to the I.E.E. by Messrs. H. E. Cox and L. Drucquer, but also of causing important principles to be overlooked. Figures such as 25 MVA at 400 V given by the authors may seem paltry compared with the several hundreds of MVA safely dealt with by circuit-breakers designed for higher voltages unless full weight is given to fault-current rating. Most of the damage suffered by lower-voltage gear occurs while attempting to overcome the stresses imposed in closing on a fault when the breaking amperes squared may have to be multiplied by 2.55. For detailed studies of this aspect of medium-voltage circuit-breaker performance readers are referred to articles by Mr. R. T. Lythall which have appeared in our columns. Voltage becomes of relatively minor importance compared with current in the circumstances, but users are inclined to expect more of medium-voltage switchgear designers than is warranted by sound practice.

Physics and Electricity

A GOOD perspective of the march of technical developments can be obtained from the reviews of progress (usually over three-year periods) which are given from time to time in the I.E.E. *Journal*. The addition of electro-physics (by Dr. N. Campbell) to the number of subjects is to be commended, for although it is more remote from the application of science than those with which engineers mainly deal, it is at least a reminder that for new fundamental developments in electricity one must go back to physics. But it is well to heed the reviewer's warning that the immediate value of much of this intricate work, which is defining nuclear structure and helping the identification of transformation products brought about by swift particle bombardment, relates to the provision of mathematical apparatus for dealing with any fundamental assumptions that may later seem to have some physical basis. He shows how the more recent advances in nuclear physics, cosmic-ray studies and astrophysics have provided strong support for the fundamental conceptions of quantum mechanics, which underlie all modern physical theory.

Order and Disorder

As to molecular physics, the conceptions of order and disorder, which were originally devised to explain the properties of alloys, are assuming ever-increasing importance. They are applicable to all "co-operative" phenomena, of which ferro-magnetism is typical, because the forces orientating any molecule depend upon the extent to which its neighbours are orientated. One development of consequence in the instrumental field has been a lessening of the damping effect exerted by the tuned circuit grid in electronic valve oscillators. The practical benefit has been an increase (from a few watts to many kilowatts) of the power generated at the higher frequencies. This resulted from study of first principles, which showed how the efficiency could be bettered by ensuring that the electron transit time was much less (not merely not greater) than the period of oscillation. Diminution of the retardation of the electrons enables them to continue giving sufficient energy to the field within the conducting enclosure to maintain the oscillation.

EXPORTS—A VITAL NEED

The Electrical Industry's Part

By The Rt. Hon. R. S. Hudson, M.P.

Parliamentary Secretary to the Department of Overseas Trade

AS Minister in charge of the Department of Overseas Trade, I am asked to address your readers on the urgent necessity of increasing the export trade of this country and to assure them that my Department, in conjunction with the Board of Trade, is striving by every means in its power to assist the exporter in the difficult task which now confronts him.

The Department of Overseas Trade is continuing as in peacetime to make available to exporters various kinds of commercial information such as market conditions, names and status of agents, customs regulations, exchange restrictions, &c. Since the outbreak of war, it has, in addition, provided a special service to exporters, to enable them to obtain, so far as possible, through one channel, advice and information on the problems which arise under war conditions, and which may be the concern of a number of Departments. This special service has proved effective in rendering to exporters valuable guidance and assistance in connection with the operation of the various Controls, whether raw materials, censorship, exit permits and so forth. I am glad to be able to record that a very considerable use of this service has been made by a large number of exporters.

I have also set up a Committee, consisting of senior officers of Chambers of Commerce in a number of the most important industrial centres, representatives of the Association of British Chambers of Commerce, the Federation of British Industries and the National Union of Manufacturers. This Committee, with my Department as its meeting place, not only will provide a channel for the investigation of difficulties experienced up and down the country by manufacturers and merchants, but should also do much to encourage export effort and to provide the Department with an appeciation of the industrial capacity available for export.

The Rt. Hon. R. S. Hudson, M.P.

Let me turn for a moment to the consideration of our export effort. To all it is abundantly clear that the sale of our war effort, already great and still gathering momentum, must entail an aggregate expenditure overseas of vast proportions; it is equally clear that we must do all we can to meet that expenditure without trenching too deeply upon our capital resources invested overseas. Only by reducing consumption on unessentials at home and by increasing our exports can we achieve that purpose. In this war we are all fighting with our backs to the wall; only by exporting and by fighting, and by exporting to enable us to go on fighting, shall we win our way to safety and to victory over the forces that threaten not merely the ideals we cherish but our very existence.

In the national effort the electrical industry is playing, and will continue to play, a most important part. Not only is it devoting much of its output capacity to the supply of munitions of war and to the provision of power and plant for the use of other industries, but it is doing its best to supply a wide range of goods which are in demand in a very large number of countries overseas.

I wonder how many of us ever give a moment's thought to the enormous part played by the electrical industry in our everyday life, how much that industry provides us with a whole range of luxuries, comforts and necessities. It is just because the electrical industry covers so vast a range of products that enter into our daily life that it can play a leading part now that we are engaged in war. Every civilised country in the world is in need, and in constant need, of a large range of its products; in many countries only some of these will be produced—for those not locally produced these countries must rely upon imported goods. Nor will it be forgotten that German competition, so insistent during recent years, has now been eliminated so far as concerns great portions of the world; this provides our electrical industry with an opportunity of which I feel sure that it will make the fullest use, not only in its own interest, but still more, in the interest of the country as a whole.

It may be difficult to capture trade in countries whose frontiers run with those of Germany since the enemy is making even more than his usual effort to retain his share. But even in this field, there is no reason for despondency since signs are not wanting that the manufacturers of the Reich are not able to do all that is demanded of them. Even though other competitors are in the field, Latin America may be instanced as a field fertile with opportunities because our products there are well known for their quality, and the cutting off of German supplies leaves a gap that must be filled.

Some of the products of the electrical industry are such that they will not be ordered either at home or overseas, unless there is real need for them. I have in mind, more especially, the products of the heavy electrical industry, such as generating plant for new installations or for extensions of existing power stations. These products are, I am glad to say, those of the highest value because, in relation to the raw material consumed, they probably represent the highest return. The same is true of general electrification schemes. At the other end of industry there are, however, many products which are daily in demand on the domestic market and I should like to take the opportunity of appealing, not only to the industry but also to consumers, to do all that lies in their power to reduce the home consumption of these articles in order that more raw material and more productive capacity may be available for our export trade. To carry on the present war, we must find the sinews of war—may I repeat that word "must"—and for them, we have to look to the foreign exchange that we can earn only by our export trade.

This war is one in which "lasting power" will count. "Lasting power" is largely synonymous with finance and finance synonymous with export trade. May I point out to my readers that if, in this country, we waste —and under "waste" I include, also, unnecessary demand—whether the waste takes the form of clothing, food, paper or metal goods, that total will in the year attain a vast total, and it will quite certainly require very many ships fully loaded to make good the commodities so wasted. If the raw material were never purchased, our saving in foreign currency would be very great and the need for paying freight to foreign shipping would be reduced. Alternatively, that amount

(Concluded at end of next page.)

FACTORS IN EXPORT TRADE

An Outline of Policy

By Leslie Gamage

A CONSIDERATION of our export trade to-day is meaningless, unless we appreciate that the objectives in view are two-fold, and each equally essential. The first has recently formed the theme of so much discussion and oratory as now to have become obvious—the acquisition of foreign exchange to pay for our heavy imports of war requirements, and so to play our part in ultimate victory. Side by side with this, however, there is the necessity of ensuring that *after* the war our export markets shall be still in our hands. The loss of many of our markets in the war of 1914-1918 was the main factor in causing the terrible scourge of unemployment which we have had to face ever since.

To obtain these objectives, we must first retain our existing markets—particularly in the British Empire: it would be useless accumulating exchange in London if, at the same time, we failed to supply the requirements of the countries of the Empire and so forced them to purchase from abroad. Next, we must expand these markets, and enter new ones.

It has recently been stated by Government spokesmen that the world is at present a "sellers' market." Whilst this may be true of certain industries, it most definitely does not apply to the electrical industry. In our industry we most certainly cannot afford to sit in our offices waiting for the orders to come rolling in, a policy which such a statement might seem to imply. Though Germany has, outside of Europe, been eliminated as a competitor by the magnificent work of the Royal Navy, we have still to face the competition of powerful neutrals, not only resolved, as we are, to seize the previous markets of Germany, but also seeing in our devotion to work for our country's needs an opportunity to wrest from us our existing markets, as they did before. The advantages we enjoyed by the depreciation of sterling exchange after the outbreak of war have now practically disappeared, with the increased prices we have to pay for labour and material.

Mr. Leslie Gamage is Export Director of the General Electric Co., Ltd.

This is no time for complacency. Our policy must be one of intensive salesmanship of every kind—not by Trade Missions devoted to "functions and lunctions" and good-will speeches, which to-day are as useless as the proverbial vote of thanks to the chairman at an annual meeting—but by Missions of Experts, with samples and price lists, out to book orders. And we must advertise. Our competitors in neutral countries, and our enemies, are busily propagating the idea that we are too occupied with war-work to give our attention to export. Let us tell the world by advertising that this is merely a "Haw-Haw" story, and prove our words by supplying the goods.

Naturally, we have our difficulties to face, but so have the other Fighting Services. A life without difficulties to surmount is not worth living. First comes the question of the supply of raw materials—the demands of the Services, export trade and the home market are not yet in balance, but the process of adjustment is in progress and a balance will be achieved. It is no shame to confess that we have not, like our enemies, been preparing for war these many years past, and time is needed to bring our various essential requirements into line.

Perhaps, however, the greatest difficulty we are suffering from to-day is our reluctance to quote a firm price. If there is one thing the overseas customer abominates it is the "price variation clause." We must quote firm—in many cases the customer will pay an enhanced price rather than leave the price to be fixed at a later date.

Another problem arises from the fact that export requires a special organisation with expert knowledge and experience of overseas markets. Generally speaking, this organisation is possessed mainly by the larger companies, though several of the smaller firms have, to their great credit, made their mark in the export markets. The larger manufacturers find their resources being called upon for the production of Service requirements, thus reducing their capacity for export. Whilst this may be obviated to some extent by the large firms sub-contracting Service requirements or by purchasing from the smaller firms for export, I personally feel that, apart from any organisation of the small manufacturers that may be achieved, there is here a golden opportunity for the merchant shippers, with their knowledge of markets and overseas connections, by co-operation with the small manufacturers, to renew their great tradition as the backbone of our export trade.

I am also seriously perturbed by the policy announced by the Government of restricting the home market. In the majority of products the existence of a satisfactory home market is a *sine qua non* of successful export exploitation. If the home market is removed, export trade becomes impossible or, at any rate, unprofitable, which I understand is equally to be deprecated. We must be allowed to continue a modicum of trading at home, though we appreciate that it must be on a reduced scale.

Other difficulties are gradually disappearing—shipping is moving more freely and more regularly and export licences no longer present a conundrum, though some problems still remain to be settled.

What, then, do we require from the Government? I would say we require neither subsidies on the one hand, nor interference on the other. We require their guidance as to markets in many cases, because they alone have the requisite knowledge—we require their assistance in the provision of raw materials, which are under their control. We would wish them, when purchasing from the Dominions and elsewhere, to stipulate that British goods should be purchased in return. That is all the assistance we require. We believe in ourselves—we believe that by our individual efforts in some cases and by voluntary co-operation in others, we can achieve our objectives. We can play our part in winning the war and in making our country, after the war, a better place for men to live in.

Exports—A Vital Need (*Concluded from page 297*)

of raw material could be imported and converted into export goods that would show a vast profit, in terms of foreign currency, after the raw material had undergone conversion in our factories at home. The overseas demand for those manufactured goods exists; it is on our doorsteps. And it is, in finality, waste that prevents our being able to turn that demand to good account.

Accordingly, not only to the electrical industry but to all industries—not only to my immediate readers, but, through them, to all my fellow countrymen—I make this earnest appeal "Avoid waste—avoid its twin brother, unnecessary consumption in the home market. Seek export trade and ensure it. Then victory, a victory that is beyond all doubt, shall be ours."

THE DRIVE FOR EXPORT

By V. Watlington

Director, British Electrical and Allied Manufacturers' Association

FOLLOWING five months of uncertainty, decisions on export policy have come with an encouraging rapidity. In January Sir Andrew Duncan was appointed President of the Board of Trade; the Export Council was set up early in February; and now we have the Government's approval of the policy and programme of the Export Council. The White Paper does much to clear the air and I refer to some of its more important features later in this article. Meanwhile all engaged in export can, I think, give it welcome as evidence of the drive and action for which we have been waiting.

The trade figures for January are a grim reminder of the need for action. In that month the visible adverse trade balance of the United Kingdom was £60 millions. Little argument is needed to convince us that a yearly import surplus of £700 millions is an impossible burden. Imports there must be, and our war effort inevitably means a heavier consumption of goods and materials from abroad.

The main problem, therefore, is clear—drastic reduction of imports of non-essential manufactures and of goods that can be produced at home coupled with expansion of exports by every legitimate means. The electrical industry brings a positive contribution. First, there is practically nothing electrical that cannot equally well be made by British manufacturers, and secondly, the British industry is one of the largest electrical exporting groups in the world.

Mr. V. Watlington

Prospects

Export trade is not to be had for the mere asking. It must be sought for and fought for, and now more than ever the effort must be co-ordinated. The electrical industry exports on an average up to £20 millions yearly. In 1938, in a year of general slackening of export trade, electrical exports increased to £23 millions.

Two factors influencing the demand for electrical goods are economic welfare and the development in the use of electricity. Our principal markets are in the main primary producing countries—the first to benefit economically from the conflict in Europe. The huge wartime purchases by our own and the French Governments are typical. The stimulus to production in these countries will result in a greater demand for engineering equipment. The greater urge for efficiency means electrification and the increasing prosperity of the people will bring with it an increasing demand for electrical goods and apparatus. Few, if any, of the overseas countries have reached a high degree of electrification. War conditions will give greater impetus to development and demand.

Resources

The principal feature of the White Paper is emphasis on organisation:—"The Export Council, therefore, regard it as vital that there should be an Export Committee or Group in individual industries." In this respect the electrical industry is strong. Since the last war it has grown from strength to strength and the basis of that progress has been organisation. Although co-operation for export may not have reached the pitch of efficiency of some other leading export industries the nucleus of existing home organisation provides the means for rapid development. In addition, in the fight for export trade individual manufacturers have built up successful organisations overseas. These are intact and ready.

The development of the home industry has been steadily progressive without being spectacular. Employment has fluctuated less than in most other industries and to-day the industry has available an efficient labour force of over 300,000 workers. The nation's war effort will make heavy calls upon the industry, but here it should be pointed out that the industry's highest export effort was achieved in a year when national demands were being directly experienced. Despite the increased activity of 1938-39 there was still a margin of productive capacity and labour available.

British electrical exports have grown against a background of British skill and scientific enterprise. An organised industry is capable of supplying any demands and meeting any conditions of service. The British electrical industry can furnish all the requirements of electric power supply; it can undertake the complete electrification of a railway system, of a factory or of a farm; and finally it can supply all the many appliances for the domestic consumer.

Objects

The aim of the Export Council is summed up as "the promotion of the greatest volume of export trade that can be achieved under conditions of war." That, no less, is the objective of every exporting industry. But to the electrical manufacturer there is an added interest—that of safeguarding his position in the overseas markets after the war. The value of a sound and healthy trading organism at the end of the war has not, I am glad to note, escaped the attention of the Export Council. The electrical industry has this lesson from the last war. In 1914 export trade was allowed to decline and it was many years before British manufacturers were able to recover the ground thus lost.

The greater concentration of our trade within the Empire has the advantage that such markets are less liable to the ills of economic nationalism. But, on the other hand, in the face of growing manufacturing industry in primary producing countries, inability to retain markets under the abnormal conditions of war may mean their ultimate loss.

Definite objectives in export are the concern of the Government and will call for special plans; but the broad aim for the electrical industry remains—the maintenance and development of existing markets and the creation of an export technique adapted to present requirements but flexible in the face of change.

Policy

The preference for existing channels and normal methods of trade shown by the Export Council, and the recent remarks by Mr. R. S. Hudson, M.P., make it clear that, in the drive for increased exports, totalitarian methods will not have a place. Such methods are in the outcome their own nemesis.

More, perhaps, than any other, electrical trade is built upon service, but service and quality cannot be maintained under conditions of unbridled competition. The British electrical industry builds upon sounder lines; fair trade, fair to the seller as to the buyer, with the efficiency and reliability which only a fair price can ensure. In recent years British manufacturers have lost ground to subsidised exports by other countries. Among the orders to be captured overseas these will not be the least important.

But the drive for increased electrical trade cannot be pursued regardless of consequences. It is no part of the British plan to take advantage of war conditions to secure monopoly in the electrical markets of the world. Such a policy would, apart from its effects upon

post-war trading, nullify the real purpose of the campaign for exports. It is of little value to the nation to have to import materials and then export the finished articles at uneconomic prices. In fact, such an exporter is doing a distinct disservice to the nation in time of war.

The contribution by the electrical exporter to the national effort will be to create a high value of purchasing power overseas for the imports essential for the war or, as Sir Andrew Duncan, President of the Board of Trade, recently put it:—

> "As such a high proportion of the cost of manufacture of many of the products of our electrical industry is represented by United Kingdom labour and materials, increased exports of these goods would constitute a specially valuable addition to our foreign exchange resources."

Organisation

Looking at the principal categories of electrical exports—machinery, cables, wireless, batteries, meters, etc.—it is illuminating to note the high degree of organisation that already exists. A mere list of the Associations in the industry is enough—B.E.A.M.A., C.M.A., R.M.A., A.M.A., E.L.M.A., M.M.A., and so on. Here, so far as the electrical industry is concerned, are the bases of the export war groups which the Export Council calls for in its memorandum.

The B.E.A.M.A. Council has set up, in consultation with the Export Council, two Export Committees—one for electrical and allied machinery and one for electrical goods and apparatus. In addition, mention has already appeared in the ELECTRICAL REVIEW of the export plans of other electrical associations.

The Export Council has emphasised that in the formation of export committees affiliation must be open to all on equal terms. I would like to take this opportunity, therefore, of telling electrical manufacturers who are not members of B.E.A.M.A. that the Association will welcome their co-operation in the furtherance of the Government's plans for increased British export trade.

The major difficulty confronting exporters—especially exporters of electrical machinery—in the initial period of the war has been their inability to quote delivery dates and firm prices. Materials were the principal stumbling block. As events have shown these early obstructions were more apparent than real; lack of knowledge as to what was or would be available introduced uncertainty and discouragement. The significance of export trade has, however, been recognised and material requirements for export will rank first in order of importance after direct service requirements have been satisfied.

Too much care has, perhaps, been given to the smooth working of the internal organisation of the country. Under abnormal conditions risks are called for; risks by home departments as well as risks by the exporter. Subject always to unforeseen circumstances I am optimistic that delays due to materials are being cleared away.

Conclusion

There are, needless to say, many details to be settled before the export machine is working smoothly. In the meantime it should not be overlooked that electrical manufacturers have not been idle or neglecting opportunities. The recent successful negotiations for a large power station contract for Turkey provide evidence upon this point.

The initial or temporary difficulties due the dislocation of war and of the controls have already smoothed themselves out. The materials position I have already mentioned. There remain other problems—rising costs, shipping and finance—but exporters will now have the machinery ready for direct discussion. The Export Council is the link between the Export Group and the Government. No means calculated to contribute to the end in view will be excluded from consideration, and should exceptional circumstances arise in any trade or over the whole field the Council says that it places no limit to the expedients which it would be prepared to consider.

With this manifest determination by the Export Council and the active co-operation of manufacturers the export drive will achieve its ends.

British Electrical Exports

First Eight Months of 1939

SINCE the war began the Board of Trade has not published detailed figures of our overseas trade. The last return was that for August and the appended table gives the figures for the first eight months of last year. In the last four months electrical goods and apparatus to the value of £2,956,362 were exported, giving a total for the year of £11,245,109. Electrical machinery is not now separately shown. It will be seen that all classes except generators showed a decline.

Destination	Goods and apparatus, Jan.–Aug., 1939	Inc. or dec. compared with 1938	Electric generators, Jan.–Aug., 1939	Inc. or dec. compared with 1938	Electric motors, Jan.–Aug., 1939	Inc. or dec. compared with 1938	Other electrical machinery, Jan.–Aug., 1939	Inc. or dec. compared with 1938
	£	£	£	£	£	£	£	£
Eire	277,150	+ 20,710	*	—	*	—	*	—
Channel Islands	95,897	+ 12,884	*	—	*	—	*	—
Palestine	66,817	+ 961	*	—	*	—	*	—
British West Africa	100,805	+ 1,562	*	—	*	—	*	—
Union of South Africa	1,318,618	+ 51,360	362,087	+ 61,352	157,786	− 86,349	647,600	− 323,642
British India	910,222	− 64,066	170,089	+ 2,296	161,976	+ 4,736	426,294	+ 14,862
British Malaya	298,153	+ 39,145	*	—	*	—	74,354	− 33,303
Ceylon	82,862	− 39,154	*	—	*	—	*	—
Hong Kong	87,578	− 13,601	*	—	*	—	*	—
Australia	1,426,398	− 187,840	214,500	+ 61,809	94,696	− 66,381	259,949	+ 41,130
New Zealand	665,937	− 99,776	*	—	48,602	+ 7,330	184,708	+ 51,382
Canada	78,644	− 2,577	58,606	+ 38,473	31,750	− 12,278	21,878	− 61,583
Other British Countries	474,271	+ 22,109	216,826	− 57,222	181,063	+ 17,785	287,707	− 133,117
Russia	136,081	− 109,451	*	—	*	—	*	—
Sweden	80,910	+ 1,041	*	—	*	—	*	—
Denmark	107,902	− 36,321	*	—	*	—	*	—
Netherlands	138,344	+ 5,885	*	—	*	—	37,624	− 7,243
Belgium	73,391	− 15,210	*	—	*	—	*	—
France	165,702	+ 40,081	*	—	*	—	23,336	+ 3,516
Portugal	40,150	− 8,291	*	—	*	—	*	—
Spain	13,433	− 10,883	*	—	*	—	*	—
Italy	27,521	− 25,226	*	—	*	—	*	—
Greece	68,342	+ 21,855	*	—	*	—	*	—
Rumania	147,815	+ 15,308	*	—	*	—	*	—
Egypt	139,789	+ 35,917	*	—	*	—	10,041	+ 2,614
China	52,768	+ 25,684	*	—	*	—	27,332	+ 11,415
Brazil	62,210	− 44,400	*	—	*	—	*	—
Argentina	385,232	− 17,801	*	—	*	—	69,613	+ 39,136
Other Foreign Countries	765,805	− 199,615	314,357	+ 131,477	360,681	+ 24,701	290,771	− 143,323
Total	£8,288,747	−£579,710	£1,097,988	+£238,477	£1,036,554	−£110,456	£2,361,207	−£538,156

* Not shown separately.

SURVEY OF WORLD MARKETS

Electrical Trade Figures and Prospects

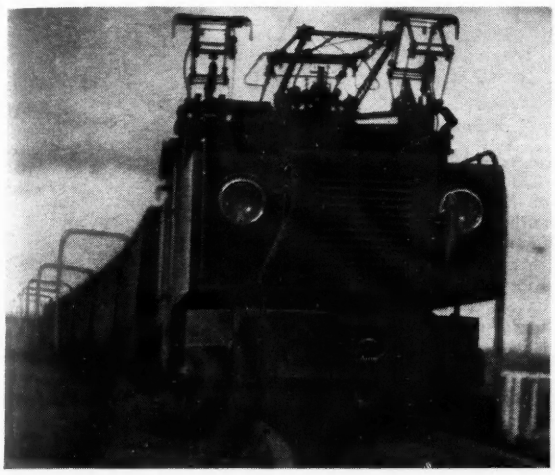
The following notes are intended to afford an idea of the volume and nature of electrical trade in the principal Empire and foreign countries. Particulars of important work in hand or in contemplation are also given. Particular stress is laid on Imperial trade, for normally about 70 per cent. of our electrical exports go to Empire countries. No attempt has been made to deal with the complicated questions of tariffs and exchange ; guidance upon these and other matters is available from the Department of Overseas Trade, whose services are dealt with by Mr. R. S. Hudson on page 297.

Empire Countries

Australia

During the depression of 1931 onwards there was a considerable slowing-down of electrical development in Australia but since 1936 there has been a great improvement and in 1937-38 the pre-depression level was regained so far as the purchase of electrical equipment was concerned.

This led to a restoration of the British electrical import trade



Electric locomotive hauling brown coal from the Yallourn (Victoria) open cut

but purchases from other sources were reduced, the principal reason for this being the growth of home production which rose in value from £2,271,000 (sterling) in 1927-28 to £4,297,000 in 1937-38. Consequently, while the United Kingdom's participation in the total business actually fell from 44.8 to 39.9 per cent., its share of the import trade increased from 48.7 to 74.4 per cent.

The total value of electrical imports in 1937-38 was £5,061,000, an improvement of £1,425,000 as compared with the preceding year. Electric wire and cable constituted the principal item in imports of this class, being valued at £1,437,000. Next in order came "telephone switchboards, distributing boards and appliances" (£832,000), radio valves (£731,000), dynamo-electric machines (£647,000), lamps (£230,000), motors under 1-hp. £189,000), regulating, starting and controlling apparatus (including distribution boards and switchboards) (£185,000) and circuit-breakers (£178,000).

Electrical development in the Commonwealth is very advanced but a great deal more is being done, particularly in New South Wales and Victoria. The 104,000-kW Kiewa hydro-electric scheme in the latter State will involve an expenditure of over £6,000,000 during the next ten years. The extension of the Newport "B" station is expected to cost over £2,000,000 by the time it is completed in 1948.

Up to the outbreak of war German competition was very keen, aided no doubt by export subsidies, especially in tenders for large plant. A year or two ago an order for a 30,000-kW turbo-generator went to Switzerland.

British exporters are assisted by a generous tariff preference, but in some instances home industries are protected by high duties and this has led to manufacturing in Australia by some British concerns. The methods of handling Australian business vary widely from the organisation of subsidiary companies to the appointment of agents. The large purchases of raw materials and foodstuffs which Great Britain is making in Australia should lead to a large measure of "reciprocity" as a means of securing payment.

New Zealand

For its size and population, New Zealand is one of the most electrically developed countries in the world. The Government's electrification scheme had already cost £35.5 millions by last year, but extensions will constantly be necessary to cope with the growing demand actively fostered by the Government. The per capita consumption in 1938 was 659 kWh and the capacity of plant installed was nearly 380,000 kW—about three times the capacity at the end of 1936. The extension of the principal hydro-electric developments is continuing.

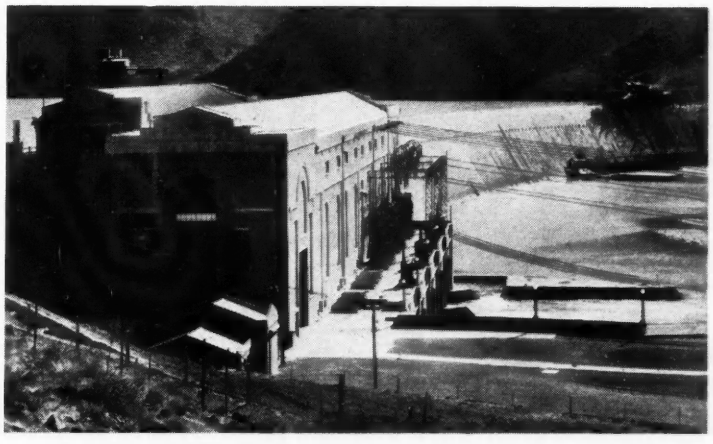
In the course of an article in our issue of May 5th last, Mr. F. N. Stace said that in view of the projected expansion of the Dominion's manufacturing industries it was probable that thermal stations would be required to meet the immediate demand until new hydro-electric power was available. This industrial expansion is a matter which deeply concerns British electrical manufacturers. It has led to the imposition of an import licensing system which is likely to have the greatest effect upon the sale to New Zealand of the smaller appliances which can be manufactured within the country. It does not appear as though the larger plant will be affected.

New Zealand is favourably disposed towards British goods and last year Mr. Walter Nash, the Minister of Finance and Customs, gave an assurance that his Government's policy was to relax the restrictions as soon as possible and ensure the maximum expansion of trade between the United Kingdom and Great Britain. Import restrictions would not be employed to foster uneconomic industries. The long-term contracts entered into by this country for the purchase of New Zealand's pastoral products should be a great factor in encouraging the Dominion Government to live up to this declaration. It should also speed up rural electrical development and thus expand the market for electrical equipment.

The latest trade figures cover the first eleven months of 1939. The imports of the leading items of electrical machinery and equipment totalled £2,353,000, against £2,589,000 in the corresponding period of 1938. Radio apparatus was valued at £270,000 (against £403,000) and vacuum cleaners at £113,000 against £122,000. The United Kingdom supplied the bulk of these exports with the United States occupying second place. Imports from Germany were small.

South Africa

Practically the whole of the electrical apparatus and machinery used in South Africa is imported, the only local manufacturing concerns so far established being one making electric cables, one making street poles and one making electric cookers. Of the imports valued at £6,645,000 in 1938, the United Kingdom was responsible for £4,275,000 : these figures were respectively £197,000 and £377,000 higher than in 1937.



Waitaki power house and dam, South Island, New Zealand

Transformers and "other electrical materials" were particularly in demand in 1938, the imports being approximately 50 per cent. and 25 per cent., respectively, greater than in the year before.

Most of the largest British manufacturers of electrical equipment are represented in the country, while there are very few of the better-known British, Continental and American firms who are not represented by agents. Consequently, very great keenness in tendering is experienced and this was particularly noticeable in the case of German concerns, who managed to secure orders to the value of over £500,000 in 1938, cables valued at £118,000 being the principal item.

A tendency towards "buying British" which has existed in several of the larger municipalities for some time has become more pronounced, especially since the war started, but the extent to which this is given effect is limited by the keenness of the competition met with. Preferential treatment is granted to goods manufactured in the United Kingdom, Canada and Eire, through the customs tariffs by giving a margin of preference of 5 per cent. duty over similar foreign-made goods. In respect of electrical machinery and equipment for generation, transmission and distribution of electricity, this has the effect of allowing British manufactured articles to enter duty-free, a minimum duty of 5 per cent. being charged on similar material imported from other nations. Dumping and exchange duties have been instituted for the protection of local industries, but these do not apply to any appreciable extent to electrical plant and equipment.

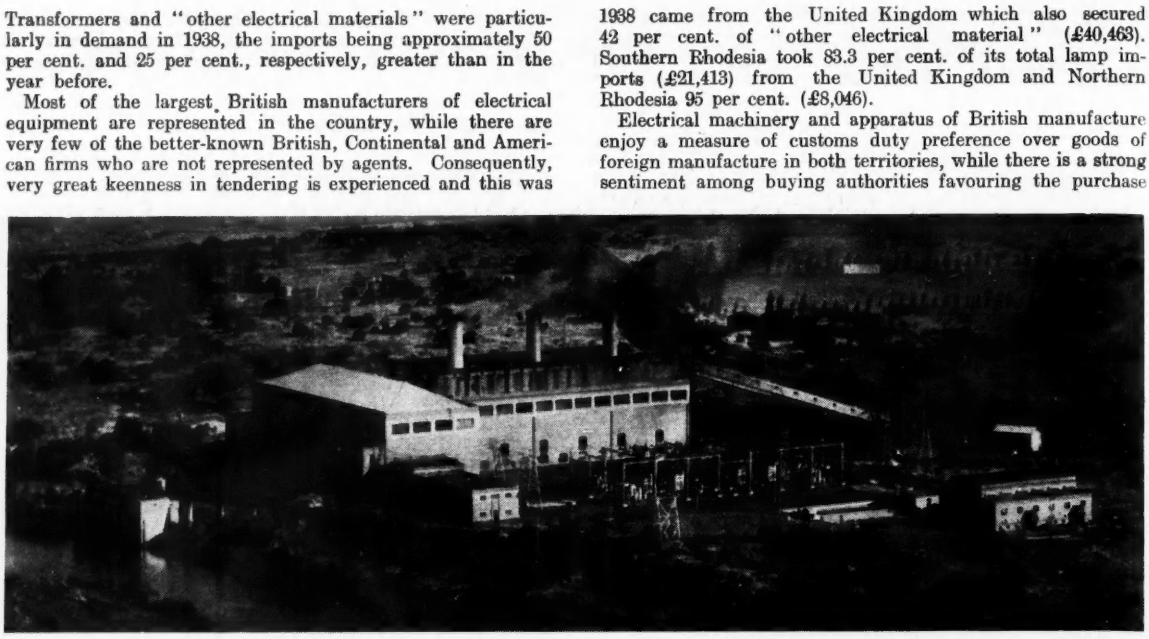
Mr. H. A. Eastman showed in our issue of June 2nd last that electrical development had been phenomenal in the last few years. In 1938 the consumption per head (excluding natives) was 1,670 kWh, or for the whole population about 600 kWh. While the advance has been mainly in the mining fields and in industry, domestic development has also made great strides. Considerable extensions of plant are in hand or in contemplation and there is every indication that electrical progress will continue.

The Rhodesias

During the past few years the United Kingdom's share in the imports of electrical machinery into both Southern and Northern Rhodesia has amounted to approximately mately three-quarters of the total. This encouraging feature of the trade is rendered all the more important when it is realised that the total imports under this classification have increased from £247,132 in 1937 to £392,804 in 1938 in Southern Rhodesia, and from £247,479 to £473,643 in Northern Rhodesia. The principal reasons for these increases are the activities of the Electricity Supply Commission in Southern Rhodesia and the development work on the mines of the copper belt and at Broken Hill in Northern Rhodesia. As quite a number of transformers ond motors came from Germany before the war there appears to be every reason for optimism as to an extension of British import trade.

No less than 82.5 per cent. of the £134,969 worth of imports of electric cable and wire into Southern Rhodesia in 1938 came from the United Kingdom which also secured 42 per cent. of "other electrical material" (£40,463). Southern Rhodesia took 83.3 per cent. of its total lamp imports (£21,413) from the United Kingdom and Northern Rhodesia 95 per cent. (£8,046).

Electrical machinery and apparatus of British manufacture enjoy a measure of customs duty preference over goods of foreign manufacture in both territories, while there is a strong sentiment among buying authorities favouring the purchase of British goods where feasible. The principal municipal authorities give preference to goods of United Kingdom manufacture, and many valuable contracts have been awarded to British firms in face of strong competition. Most United Kingdom manufacturers competing for the Rhodesian markets have not yet solved the problem of representation satisfactorily, and many would benefit by establishing their own offices, not only for the supply of plant, but also for giving advice to prospective customers.

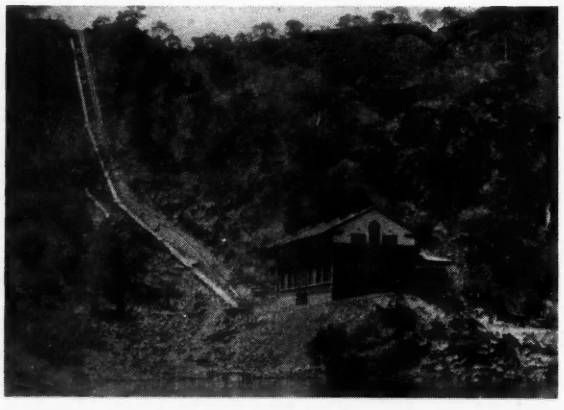


The South African Electricity Supply Commission's station at Colenso, Natal

Smaller African Markets

Although the United Kingdom has already achieved the position of being by far the largest supplier of electrical apparatus and machinery to the smaller African markets—in 1938 the share was approximately three-quarters of the total trade—there appears to be a singular opportunity at the moment for still further increasing sales of British equipment by filling the gap left by the cessation of imports from Germany. This is particularly the case in connection with the former German colony of Tanganyika: here, before the war, the trade was shared almost equally by the United Kingdom and Germany.

Compared with the Union of South Africa and the Rhodesias the import market is small, amounting in 1938 to about £360,000 for the Gold Coast, £250,000 for Kenya and Uganda, £150,000 for Nigeria, and £90,000 for Tanganyika. The largest items were £207,000 for electrical machinery and £124,000 for "other electrical apparatus" for the Gold Coast, and £66,000 for electrical machinery for Kenya and Uganda. Regarded as a whole, the market for electrical equipment and appliances will remain of modest proportions until such time as industrial development or settlement schemes lead to a marked increase in the number of consumers but consumption of electricity records an advance with each year that passes and the demand for appliances is bound to grow. Prospects for increasing this trade depend, too, very largely on the local crops, and the consequent state of exports.



Penstock and power house at small Victoria Falls hydro-electric station

Canada

The proximity of Canada to the United States and the Dominion's preference for American standards are two serious handicaps to British manufacturers. Another is the growing industrialisation of the country; in 1937 the Canadian electrical manufacturing industry employed 21,700 people, many factories being under the control of American concerns. The production of the 191 firms was valued at $98.8 millions, the principal products being wires and cables and radio equipment. The industry has a small export trade ($3,864,000 in 1938-39). Canadian imports of electrical goods and machinery

in 1938-39 were valued at $12.5 millions. The United States accounted for $10.1 millions and the United Kingdom for only $1.8 millions.

The foregoing shows how difficult the market is for British electrical manufacturers, although business is being done by concerns which pay particular attention to the peculiar needs of the market. This necessitates a very thorough study of the conditions. For instance delivery of plant is not a matter of shipping it to an Atlantic port; it may have to go to a remote part of the interior to which transport is slow and difficult and even impossible at certain times of the year.

Service is another direction in which careful planning is needed. Mr. C. G. Abbey writing in our issue of April 7th, 1939, expressed the view that the only satisfactory alternative to a strong service organisation is to have direct representation or competent engineering agents in the principal cities of the Dominion. He also drew attention to the fact that all electrical equipment has to receive the approval of recognised Canadian authorities.

India and Burma

While the general standard of living in India is not very high, there are many communities in which electricity is coming to play an important part. In particular the schemes of development undertaken by Government authorities have necessitated large purchases of electrical equipment. The works carried out in Madras, for instance, had an output of 136 million kWh in 1938; of this about 80 per cent. was consumed by the textile, cement and tea industries and for tube-well irrigation. A similar proportion of the electricity generated by the Mysore Government schemes is absorbed by industry. There is also considerable electrical activity in the United Provinces, the Punjab (where the Uhl River is being utilised to produce 120,000 kW ultimately) and Malakand.

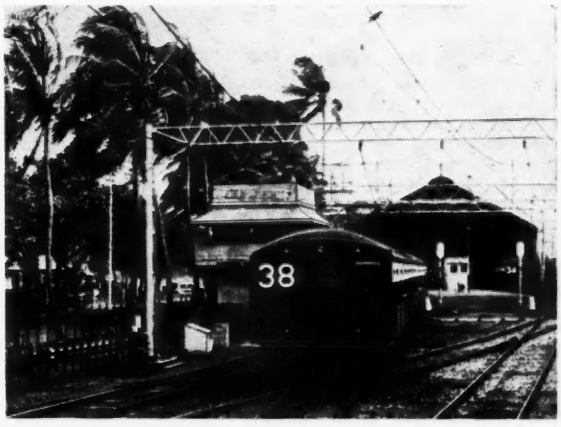
Great Britain is responsible for over half of the electrical apparatus import trade. In 1938-39 out of a total of Rs. 331 lakhs this country supplied goods to the value of Rs. 194 lakhs. Germany's share was valued at Rs. 54 lakhs, that of the United States at Rs. 29 lakhs and that of Japan about Rs. 10 lakhs. The disappearance of German competition may provide opportunities for Japan, but British manufacturers should be able to secure a fair share of the trade thus made available. Electric wires and cables form about a third of these imports; next in order come lamps, fans, batteries and telegraph and telephone instruments.

Imports of electrical machinery in 1938-39 were valued at Rs. 372 lakhs. The shares of the leading suppliers were as follows:—United Kingdom, Rs. 234 lakhs; Germany, Rs. 62 lakhs; and the United States, Rs. 21 lakhs. The principal items in order of importance were control and switchgear; motors; generators, alternators and dynamos; and transformers. Reference was made in the last report of the Senior Trade Commissioner to subsidised German competition and to the increasing activity of Swedish and Swiss firms in this trade.

Representation in the market is usually through established concerns with branches throughout India, which probably handle many non-competitive lines. In addition it is advantageous, if the business or prospective business warrants it, to send out a man capable of dealing with technical problems and advising on their solution.

Mr. Russell Potts, writing in our issue of May 19th last, considered that India to-day offers more possibilities to the electrical manufacturer than probably any other part of the world, largely on account of the growing industrialisation of the country. While this means principally the provision of motors, transformers and switchgear the domestic market is also a slowly growing one.

The American official view of electrical trade prospects in India is that the ground lost by United States products during the past few years may be regained now that German products are excluded from that market. It is thought, too, that the remaining principal competitors, the United Kingdom and the Netherlands, will experience increasing difficulty in continuing their normal trade. The Electrical Division of the U.S. Bureau of Foreign and Domestic Commerce states that new and additional demands are being made on American sources of supply for electrical materials that buyers in India formerly purchased elsewhere. Among the most promising lines, the report adds, are electric fans, insulated wire and cable, telephone and telegraph instruments and apparatus, electric lamps, motors and all types of electrical machinery. Several new items are said to be making marked progress there. Outstanding among these are arc welding sets and portable electric tools, which are being employed in increasingly large numbers in India's expanding industrial structure, together with air-conditioning units.



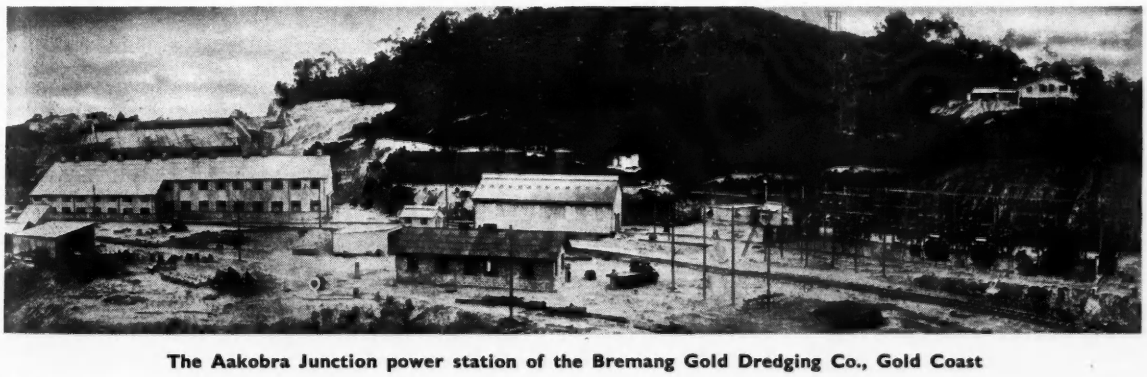
The extended electrification of the railways in India has brought a number of contracts to British firms

In 1938-39 the electrical import trade of Burma had a total value of £344,000, which was practically the same as in the preceding year. But while the share of the United Kingdom rose from £159,000 to £182,000, that of the United States declined from £67,000 to £46,000. Electrical machinery was the leading item (£124,000), and imports of batteries amounted to £57,000.

Eire

This conveniently situated market has shown remarkable development in the past few years, mainly on account of the activities of the Electricity Supply Board in whose hands the whole of the country's electrical resources now rest. In the early stages of this development British manufacturers did not loom large: the important Shannon Scheme was carried out by a German concern and German influence extended into the utilisation field. Some of the plant for the new Liffey hydro-electric scheme is, however, being supplied by a British company. The Liffey plant is expected to be installed by the middle of next year. It will have a total capacity of 34,250 kW.

The past ten years have seen a growth in the number of consumers from 48,606 to 160,382 and in the sale of energy from 43 million to 295 million kWh. The average price has fallen from 2.66d. to 1.54d. per kWh. About 43 per cent. of the sales were attributed last year to motive power; domestic supplies accounted for 17 per cent. and general heating, cooking and water heating for about 15 per cent.



The Aakobra Junction power station of the Bremang Gold Dredging Co., Gold Coast

The Board's report for 1939 referred to the marked developments in the use of electricity as the sole source of heat for laundries and in its application for sterilisation in dairy farms. The Board sold appliances and apparatus to the value of £79,574 during the year and carried out installation work to the value of £66,628.

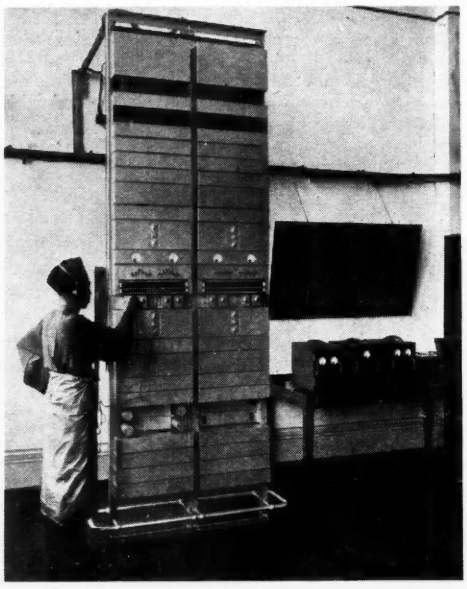
In 1938 the total imports of electrical machinery and apparatus amounted to £1,327,000 of which £664,000 came from the United Kingdom and £393,000 from Germany.

British West Indies

The West Indian Archipelago provides a number of small scattered markets of which Trinidad and Tobago were the most important in 1938. The total value of electrical imports was £133,568, over 34 per cent. more than in 1937. The United Kingdom benefited from this improvement with £77,588 (against £38,236), while the United States' share remained stationary at about £42,500.

Board of Trade figures show that the electrical import trade of Jamaica was £102,000 in both 1937 and 1938. The United States headed the suppliers' list with £58,000, the United Kingdom being credited with £35,000.

The electrical imports of the Bahamas have been very much up and down in the past few years, although the general tendency is upward. In 1938 the total value of electrical apparatus and appliances imported was £25,085 and the bulk of it was supplied by the United States.



Telegraph equipment exported from this country to Singapore

Malaya

The figures covering the electrical imports into British Malaya for 1939, so far available, show that the three main sections into which the various classes of electrical goods can be divided have each been affected by different local conditions. And when forming an opinion about the business for the balance of the year, it is possible to draw some helpful estimates by examining those local conditions during the latter months of 1939.

The three sections referred to are, first, telephone and telegraph instruments, apparatus, and cables; the totals of these show that their combined figure was some 28 per cent. behind the 1938 figure. As these purchases are almost entirely controlled by the official programme drawn up in advance, it is unlikely that the last months brought any improvement. Indeed, difficulties of shipment, due to the need of convoy and shortage of cargo space, may have caused a further set-back.

The second section comprises the heavy electrical machinery which mines and the adjacent power supply organisations need. Here imports of transformers and convertors, motors,

A good example of modern lighting on the Wrightson Road, Port-of-Spain, Trinidad

and switch- and control gear were some 20 per cent. less than in 1938, but generators promise a slight increase. But the large increase in the tin quota, together with the high price ruling during the latter half of 1939, will certainly have resulted in considerable extensions and renewals. These should be reflected in the figures for the remainder of 1939, provided deliveries permit.

Thirdly, the figures of lighter electrical goods which sell largely through the bazaar reveal one or two interesting developments. The large imports of electric hand flash lamps have fallen in value by about 25 per cent., which is surprising in view of the high prices of rubber and tin, and the consequent good level of native earnings. The fact is that small local manufacturers have started to make these popular lines, but are still purchasing the batteries, as is shown by the continued large import of these, a large proportion of which is now bought from a big factory in the Dutch East Indies. The market for radio sets has only been touched, although imports for 1939 show a further increase, of which British manufacturers have the larger share. The development really depends on the provision of higher quality broadcasting for the European and educated Asiatic population.

Although the final results for 1939 may not reach expectations, the outlook for 1940 is brighter in British Malaya than for many years past.

Under an Order of the Federated Malay States Government dated December 21st last, the importation of many classes of goods from sources other than British countries on a sterling basis, Egypt, the Anglo-Egyptian Sudan or Iraq is absolutely prohibited. The schedules with the Order include practically all classes of electrical machinery and apparatus including radio equipment. The few remaining classes of electrical equipment in a separate schedule are subject to import licences.

Europe

France

A feature of French electrical trade in 1938 was an advance of £856,590 in the value of exports and one of only £190,031 in imports. On each side of the account the leading items were "telegraphic, telephonic and other (presumably small) electrical apparatus," and "dynamo-electric machines, transformers and parts." Lamps figured largely in the imports and wires and cables in the exports. The Board of Trade figures for 1938 showed that our exports to France were valued at £19,643 (goods and apparatus £17,821, machinery £1,822), while our imports from France amounted to £124,888 (against £91,885 in 1937).

It is worthy of note that both exports and imports of domestic appliances showed a substantial increase in 1938. Exports were £137,940 (against £83,060 in 1937) and imports £214,530 (against £162,140).

Last week a series of meetings was held in London, under the auspices of the Federation of British Industries, between representatives of leading French and British industrial organisations. It was hoped that following upon agreement in general principles on such matters as closer economic co-operation, and the endeavour to bring about an orderly transition from war to peace conditions further conversations would be held between representatives of individual industries. The French delegation included Monsieur Detoeuf, president of the syndicate Général de la Construction Electrique. Some notes on the discussions appear on page 311.

Scandinavia

A very promising market indeed is offered by the Scandinavian countries to foreign exporters of electrical goods. The import trade in 1938 was valued at about £8¼ millions—double the figure for exports, Sweden spending £4,000,000, Norway £1,850,000, and Denmark £1,100,000. A common trait of all the markets is the growing demand for generating machinery and associated equipment such as transformers, convertors and heavy switchgear, the result of many private and public schemes to expand the electric power supply systems.

At present the United Kingdom's share in supplying Sweden's electrical requirements is somewhat meagre, amounting in 1938 to only just over 6 per cent. of the total. Any deterioration in the relations between Sweden and Germany, however, might have a very considerable effect on the position since the latter country now supplies over half of the total imports. Except in the case of radio apparatus, the import trade showed an advance in practically all sections in 1938.

Most foreign exporters are represented in Sweden by Swedish agents or firms, but two large German companies have estab-

lished their own sales organisations. The reason that such a large hold on the market has been achieved by German manufacturers is that in Sweden installation engineering has followed the same lines of development as in Germany and has adopted the same standards in respect of dimensions, &c. Electrical imports are subject to a 15 per cent. *ad valorem* customs duty. No formal import restrictions exist, but the control exercised by the Swedish Bureau for Testing Electrical Materials has a certain restrictive effect, in so far as only tested and approved materials may be sold and used.

Detailed trade statistics have now been banned by the Swedish Government. The figures for the first nine months of 1939, however, put the total imports at 65 million kronor, of which Germany supplied kr. 35.4 million, the United States kr. 9.4 million, Holland kr. 6.4 million and Great Britain kr. 3.1 million. Exports were valued at kr. 51.5 million. Finland was the largest customer (kr. 7 million), while Great Britain's share was given as kr. 2.9 million.

Norwegian electrical imports have recently shown a rising tendency; in 1939 the total was kr. 45.4 million against kr. 41.4 million in 1938. Among the items making the greatest advances were cables, telephone equipment and insulators. This week an Anglo-Norwegian Trade Agreement was signed.

In 1939 Denmark's imports of electrical machinery and apparatus had a total value of kr. 27 million against kr. 25 million in 1938. Germany increased her quota from kr. 14.8 to kr. 16.3 million, but Great Britain's share fell from kr. 5.1 to kr. 4.1 million. At the same time Danish exports rose from kr. 17.3 to kr. 17.8 million.

The Vemork (200,000-HP) station of the Norsk Hydro-Elekrisk Kvalstof A/S

Baltic States

The four small Baltic countries, Finland, Lithuania, Latvia, and Estonia, are not well advanced electrically but there are certain opportunities.

Finland has made some progress in the development of her water power and in 1938 imported electrical equipment to the value of £1,300,000. The demands for lamps, batteries and radio apparatus was showing a steady increase before the country's invasion by Russia.

Lithuania is also taking steps to utilise her water-power resources. A year or two ago a company was formed, with State participation, to erect hydro-electric power stations and to develop the use of peat fuel. Plans for the electrification of the country are in the hands of the Lithuanian Power Committee. One project which has been put forward is the construction of a hydro-electric station at Turniskiai which, it is claimed, will obviate the proposed extension of the thermal stations in the capital, Kaunas, and Vilna. The work will be carried out by the above-mentioned company. Hitherto the Lithuanian electrical industry has been largely in the hands of Belgian capital.

The most important electrical project in Latvia is the Kegums station on the River Daugava, which is designed for an initial capacity of 50,000 kW (70,000 kW ultimate). The work is being carried out by a Swedish concern at a cost of about £1,600,000. Apart from this, there are few large undertakings; in 1938 about 128 million kWh was produced by 70 stations. A large peat briquetting plant also under construction will have a power station connected with it.

For many years Latvia has depended almost entirely upon Germany for electrical equipment, but this position has been considerably altered by the development of local manufacture. Electrical business is usually done through agents and from one to five months' credit is expected.

Estonia has a small electrical import trade about half of which has hitherto been secured in Germany. Sweden takes about 20 per cent. and Great Britain about 11 per cent.

Belgium

Although Belgium has a first-rate electrical manufacturing industry and exported electrical equipment valued at 456 million fr. (£3.1 million) in 1938, she is still an importer, having purchased abroad during 1938 electrical goods to the value of 395 million fr. (£2.7 million). Germany was by far the most important supplier, while France, Holland, Switzerland, the United States and the United Kingdom all shared in the remainder of the trade, this country's quota being about 27 million fr. (£186,000). British radio valves and vacuum cleaners were prominent items. Belgium can be covered by one firm of agents and Mr. Paul Pochet in an article published in our issue of July 11th last expressed the opinion that there was some scope for British manufacturers in the expanding Belgian electrical market. With a per capita consumption of about 600 kWh per annum Belgium claims to be the most electrical of the countries without hydro-electric resources.

Holland

The Dutch electrical market is similar in character to that of Belgium. Although not so industrially developed Holland has about the same population, and is a country where, on account of the high standard of living and stable currency, sound business should be obtainable. As in Belgium, business is done mainly through commission agents.

There is a small but strong electrical manufacturing industry, but a large proportion of the electrical requirements is imported. In 1939 the total value of imports was 38.8 million guilders, the principal items being measuring instruments and other apparatus, radio sets and parts, and telegraph and telephone material. Exports, valued at 65.2 million guilders, consisted mainly of radio sets and parts, measuring instruments and lamps. Great Britain's share of the trade was comparatively small. During 1939 the value of the guilder varied between 8.70 and 7.54 to the £.

Italy

Thanks to her abundant water-power Italy is one of the most electrically advanced European countries. But this is true in the industrial and transport spheres only; domestic electrification has made little headway. The Italian electrical manufacturing industry enjoys an international reputation, but the country still imports a substantial amount of electrical machinery and apparatus. This comes largely from Germany, the British share being of negligible proportions.

Trade is restricted by licensing and currency restrictions, but according to a reliable Rome correspondent who dealt with the subject in our issue of July 14th last, the difficulties are not insuperable. The high quality of British electrical goods is fully appreciated, but the prices are considered too high. The fall in the external value of sterling should help to counteract this. The correspondent advocated a close preliminary study, adequate advertising, and the opening of a branch or the appointment of a technically qualified agent and organiser.

Spain

The reconstruction of Spain after the civil war should afford an opportunity for electricity. Hitherto the country as a whole has been very backward electrically except in the larger cities, notably Barcelona, where the electricity supply and traction systems are operated by a Canadian registered company. The sales of this organisation are in the neighbourhood of 100 million kWh a year.

Practically all Spain's requirements in the way of electrical equipment are imported. During and since the civil war figures of the country's external trade have not been available. Before the war the annual value was of the order of £1,600,000. Germany predominated in almost every section of the trade with the United States second. The United Kingdom's share was comparatively small (about £100,000 in 1935). The latest available Board of Trade figures show that in 1938 our exports of electrical goods and apparatus to Spain amounted in value to only £4,479 which, however, was an advance of £1,924 over the previous year's figure and further improvement can confidently be anticipated.

Portugal

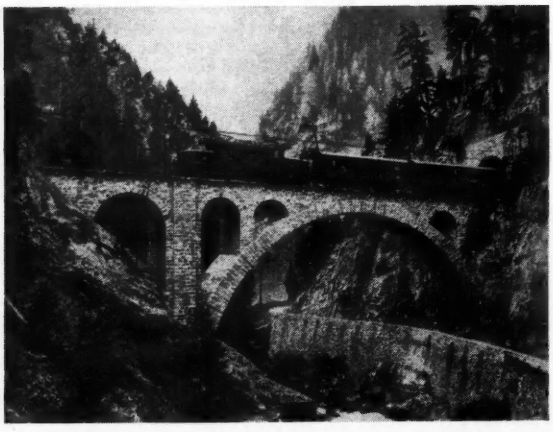
In the electrical sense Portugal is a long way behind many European countries but progress is being made. The 1938 out-

put of electricity was 425.7 million kWh, which represented an advance of 5 per cent. over 1937. The bulk of the generating capacity is confined to ten stations which represent 165,000 kW of a total for the country of 213,000 kW. There were 320,600 consumers in 1938. The bulk of the power is used for industrial purposes, principally in textile factories which took about 18 per cent. of the output.

In 1938 Portugal purchased electrical goods and apparatus to the value of £5,580 from the United Kingdom, an increase of £1,038, so that there is plenty of scope for improvement.

Switzerland

Switzerland, with a small but well developed home electrical market and a strong electrical manufacturing organisation, is on balance an exporter rather than an importer of electrical equipment. For instance, in 1938 while exports were valued at about £2,600,000, imports were only about £900,000. Our purchases from Switzerland amounted to £175,000 while our



A picturesque section of the Swiss Federal Railways

sales to that country were considered by the Board of Trade to be too small to be classified separately; our imports included meters and measuring instruments (£4,400); dynamo-electric machines (£13,600) and unspecified apparatus (£5,000). Germany was the principal supplier of electrical goods to Switzerland.

The Balkans

Due to their geographical situation, the Balkan countries, Hungary, Yugoslavia, Roumania, Bulgaria and Greece, inevitably take a very large proportion of their electrical imports from Germany. British goods are, however, held in high esteem, and all the countries appear to be favourably disposed towards increasing their trade with Great Britain.

Of Roumania's electrical imports valued at 1,151,928,000 lei in 1938, Germany was responsible for just over half, the only classifications under which the United Kingdom showed any prominence being telephone, telegraph, signalling and bell apparatus (23,183,000 lei); radio and electro-magnetic apparatus (21,255,000 lei); and metal armoured wire and cable (58,258,000 lei), which was 42,322,000 lei more than in 1937. In 1938 the lei varied between 650 to 690 to the £1.

With the exception of radio apparatus, Bulgaria's electrical requirements from abroad appear to be increasing very substantially, though the total taken from the United Kingdom is at present small. Compared with 1937, the value of imports of copper wire and cable in 1938 showed an increase from 21,537,000 to 33,601,000 leva (412 leva=£1 at par). Lamp imports rose from 9,208,000 to 14,521,000 in value and those of "motors and turbines and parts" from 11,239,000 to 20,916,000 leva. Purchases of electrical appliances and parts totalled 39,691,000 leva, as compared with 24,678,000 leva, while those of "electric motors, &c.," amounted to 39,691,000 leva (24,678,000 leva).

The external trade of Greece is subordinated to the exigencies of the numerous clearing conventions which have been concluded with countries, principally Germany, and the system has driven her trade into well-defined channels to the detriment of those countries not allied to Greece by clearing conventions or having a favourable balance of trade in their commercial relations with her. The United Kingdom falls into the latter category and her trade with Greece has suffered in consequence. The British articles which have met with greatest success to date are telegraph and telephone instruments and electrical porcelain. In 1938 purchases of electrical goods and apparatus (excluding machinery) from the United Kingdom were valued at £58,661.

In Yugoslavia electrical development is still in its infancy, and there would appear to be enormous scope for extending the electrical market as soon as financial support is forthcoming for schemes now projected. Foreign capital is, however, very expensive and Yugoslavia cannot raise the necessary money within the country. Even so between 1936 and 1937 (the last year for which official figures are available) there was an increase of 50 per cent. in the electrical imports of Yugoslavia, and although Germany maintained her predominant position in the trade, securing 58 per cent. of the total valued at 178,600,000 dinars (238 dinars=£1), Great Britain also obtained a fair share in certain groups, notably power plant, radio-telegraph apparatus and switchgear. Actually in electrical trade as a whole Great Britain nearly trebled her trade—something of an achievement in view of the fact that German standards have been adopted in Yugoslavia.

On balance Hungary is an exporter of electrical goods; the annual value of exports is of the order of £1,600,000, while imports are only around £350,000. Great Britain's share of the trade is very small. The Hungarian Government is encouraging the use of electric motors in industry, and in Budapest great efforts are being made to develop the domestic load. Concessions were recently granted to two companies for the supply of electricity in a number of small towns.

America

United States

The United States of America provides the world's greatest electrical market, but it is one which the home industry is capable of satisfying and still carry on an extensive export trade. In 1939 that industry had an output valued at $2,143 million. Electrical export trade for 1938 had a total value of over $102 million, while imports amounted to only $2 milliion.

The United Kingdom fares badly in the exchange of electrical goods. Our imports from the United States in 1937, the latest year for which detailed figures are available, were valued at about $6 million (radio equipment and refrigerators were prominent items), but our exports to the United States amounted to no more than $355,000.

Argentina

Great Britain is Argentina's principal customer for meat, cereals and other products and our trade with the Republic shows a substantial balance in its favour.

The total value of the electrical import trade in 1938 (the latest year for which figures are available) was in the neighbourhood of £2,635,000, the leading items being motors and dynamos, telephone cables, cables and wires, radio apparatus, switch- and fuse-gear, lamps and meters. On the whole the United States was the principal supplier, accounting for about £620,000 of the total. Germany, however, provided a great deal of material, notably dynamos and motors, switches and fuses, insulating tubes, domestic appliances and meters; the total value was about £528,000. The United Kingdom maintained its lead in the principal classes of electric cables and secured trade to the total value of £480,000. Some other countries predominated in the supply of particular items, e.g., Belgium in telephone cables and apparatus, Sweden in vacuum cleaners, and Japan in lamps.

A certain amount of electrical manufacturing has been undertaken in Argentina during the past few years but as yet it has not reached very great proportions. The principal advance has been made in the assembly of such appliances as refrigerators where the case accounts for the bulk of the weight and can be produced locally, the electrical equipment being imported. Local manufacture of dry batteries appears to be affecting imports and low-priced domestic appliances of Argentine make are becoming popular.

A study of the market on the spot should yield fruitful results to British suppliers of electrical goods. In an article contributed to the ELECTRICAL REVIEW a few months ago Mr. H. C. Siddeley urged the setting up of a selling organisation in Argentina. He said that there were opportunities for improved British trade in radio, accumulators, conduit, cables and electrical machinery.

At the present time several favourable factors are operating such as the depreciation of sterling, the availability of exchange for all imports from the United Kingdom and the elimination of Germany as a competitor.

Brazil

In the last year or two exchange difficulties have hampered trade with Brazil, but the United Kingdom occupied the fourth place in that country's import trade in 1936 and 1937, largely due in the latter year to the supply of materials for the electrification of the Central Railway. In 1937 the United King-

dom provided more than half of the wires and cables imported (884 metric tons, against 346 tons from the United States and 244 tons from Germany). The position and volume of trade were similar in the case of "apparatus and appliances for electric light."

Germany predominated in the supply of dynamos and generators, being responsible for 1,926 tons out of a total of 3,489 tons (United Kingdom 167 tons, United States 776 tons). In motors, too, Germany was the principal supplier; of a total of 613 tons that country provided 168 tons, the United States 165 tons, Italy 98 tons, and the United Kingdom 71 tons. Of a total of 1,218 tons of transformers Germany contributed 433 tons, the United States 423 tons and the United Kingdom 97 tons. The United States supplied the bulk of the radio apparatus, this country's share being very small.

In his last report on Brazil the Commercial Counsellor to the British Embassy, Rio de Janeiro, expressed the view that British exporters could only increase their trade by granting large credits and quoting lower prices.

Chile

The electrical import trade of Chile is not of very great proportions; in 1938 the total was in the neighbourhood of £430,000. Of this the United States and Germany took about four-fifths between them, with the United States leading. The share of the United Kingdom amounted to about £54,000.

Cables formed the principal item, and in this branch Germany was ahead of the United States, with the United Kingdom a poor third. The same position existed with regard to motors, although in this case Sweden occupied third place. This country's best effort was in telephone apparatus; of a total of £38,300, no less than £28,700 came from the United Kingdom.

The United States has been negotiating a new copper agreement with the Chilean authorities, a move calculated to strengthen trade relations between the two countries. There have been few large electrical contracts placed by Chile in the past few years. One of the most recent was a contract awarded to a German concern for railway materials, including plant for the electrification of 75 miles of route between Santiago and the port of San Antonio. This was valued at £650,000, and payment was to be made at the rate of £100,000 a year.

Peru

Peruvian imports of electrical machinery and apparatus in 1938 had a total value of 10,813,000 soles, Germany accounted for 2,150,000 soles, the United States for 5,112,000 soles, and the United Kingdom for 845,000 soles (£=20-24 soles in 1938). The trade as a whole was slightly above the high level of the previous year and five times that of 1932. A large decrease in dynamos and switchboards and telephone material and some minor declines in a few other items were offset by increases in the remainder of the list, notably material for lighting purposes. The leading supplying countries shared about equally in the increases, Italy being a good runner up. It is noteworthy that imports of machinery for a number of secondary industries increased by about 50 per cent.

The United States Department of Commerce has been drawing attention to this market which it describes as "certainly deserving of serious consideration by American exporters." The chief areas for electrical goods are Lima, Callao and several coastal towns. Italian and Swiss firms have gained from the fact that the major power-distributing company in the areas named is controlled by Italian capital and supervised by a Swiss engineer. United States equipment is favoured by the important American-controlled mining enterprises. In connection with Peru's manufacturing industries there has been an increasingly larger use of modern electrical plant. In all centres of population ranking higher than a village an electric-lighting system is regarded as a prime necessity.

Mexico and Central America

The bulk of the electrical supplies for Mexico, Guatemala, Honduras, Salvador, Nicaragua, and Costa Rica are provided by the United States although Germany has hitherto secured a fairly large share of the orders.

Mexico, the largest of these markets, imported about £1,400,000 worth of electrical equipment in 1937 largely for industrial purposes. The leading American manufacturers are well represented in the market.

The aggregate trade of the other five countries is of the order of £160,000 per annum. All the electrical developments are on a comparatively small scale and in the hands of foreign owners who obtain equipment from their own countries. The low purchasing power of the population precludes the use of electricity for domestic purposes and thus severely limits the scope for the sale of appliances.

Asia

Japan

As a market for British electrical machinery Japan is now of very little importance. That country's imports of such plant have long been dwindling, and as a whole have dropped to about one half the level of ten years ago. Of a total value of about £120,000 worth of dynamos and motors purchased abroad last year, three-quarters were supplied by the United States and one-seventh by Germany. Among her imports of other electrical goods, only telephone instruments and parts and telegraph instruments were noteworthy, with totals of approximately £88,000 and £37,000 respectively.

For a time new inventions and improved designs perfected in Britain, Germany and the United States gain a footing in the Japanese market. Before long, however, they have been imitated by local manufacturers, or production has been started at the branch factories of Western concerns. During the five years preceding the last war, *viz.*, from 1909 to 1913, British exports of electrical goods and apparatus to

Handling British cable at Hong Kong

Japan averaged £230,000 and of electrical machinery £215,000. Between 1924 and 1926 Japan halved her purchases of electric power plant from overseas suppliers, although at that period electricity supply enterprises there were expanding rapidly. But already a number of Japanese works were constructing generators rated up to 10,000 kW and motors of several thousand horse-power, for the most part by arrangement under licence with foreign makers. In smaller machinery and apparatus, *e.g.*, fans, telegraph instruments, small motors and telephones, Japan was even at that time almost self-supporting. In these circumstances, it is scarcely surprising that in 1930 British exports of electrical appliances to Japan were only £89,000 in value and of electrical machinery only £90,000. In 1937 the value of Japan's output of electrical apparatus, wire and cable and lamps was 402 million yen.

It is possible to estimate, from preliminary figures, last year's totals of some leading items in Japan's electrical export trade. Those of machinery, including transformers, exceeded £1,500,000 in value; insulated wire were nearly the same figure, lamps nearly £1,000,000, telephone instruments about £400,000, and meters £260,000, with batteries, telegraph instruments and switches each totalling over £150,000 in value. In addition to the neighbouring markets of Kwantung, Manchukuo and China, Japan found an outlet for many of the goods mentioned in India, the Dutch East Indies and Asiatic Russia. From the Indian statistics it appears that last year's imports of Japanese electrical instruments, apparatus and appliances (excluding machinery) as a whole were nearly double in value those of 1938 although about 25 per cent. below the 1937 level. The leading line was bare electrolytic copper wire of which Japan was the leading supplier, then came rubber insulated wires and cables, and vacuum electric lamps.

China

For very many years China has been an important market for British electrical plant and apparatus and in spite of the hostilities which have been in progress for about three years that trade has continued, although naturally on a reduced scale. But the possibilities in China are enormous, as Dr. Middleton Smith has vigorously pointed out in our pages on a number of occasions. The leaders of the awakened country realise fully that China can only exist in the modern world by utilising to the full modern methods of production.

The British Government recognises China as an important customer—actually and potentially—and has for this reason helped to sustain the country's currency. If and when Japan

realises that the cultivation of harmonious trade relations in China with other nations is a sound policy there will be good business for all. Those British firms which throughout the troubled past have kept a hold on the market will then reap their reward.

American competition in China is very strong and Germany, too, up to the outbreak of war was securing a good deal of the trade. The imports are of an all-round character, the predominating items being radio apparatus (mainly American), wires and cables (Germany and Japan being principal suppliers), telegraph and telephone apparatus (largely German) and electric motors (Germany, Japan and Great Britain).

The Board of Trade returns show that in 1938 electrical machinery and apparatus valued at £765,000 was imported into Hong Kong (against £480,000 in 1937). The leading items were generating machinery £157,000 (against £67,000) and wire and cable £173,000 (£117,000). The principal suppliers were Great Britain £298,000 (£181,000), Germany £113,000 (£82,000) and the United States £151,000 (£7,000).

Egypt

The friendly relations existing between Egypt and Great Britain should be reflected in an improvement in trade between the two countries. So far as electrical imports are concerned Germany has hitherto done well, largely by means of cut prices. The value of these imports has had a substantial upward tendency in the past few years and in 1938 reached the total of £E864,180 (Egyptian £=19s. 6d.). The leading items were as follows:—Generators, motors and transformers, over 50 kg., £E115,496 (United Kingdom, £E18,794; Germany, £E26,792); ditto under 50 kg., £E16,448; cables, underground and submarine £E106,157 (United Kingdom, £E22,766; France, £E28,917; Germany, £E19,131); unspecified wire and cable, £E50,675 (United Kingdom, £E7,653; Germany, £E13,978); radio receiving sets, £E107,935 (United States £E45,527; Netherlands, £E27,179; United Kingdom, £E16,414; Germany, £E9,915); telegraph and telephone apparatus, £E45,305 (United Kingdom, £E27,438); and accumulators, £E26,268 (United Kingdom, £E7,814; Germany, £E6,311).

Practically all business is done through agents and in an article appearing in our August 4th issue Mr. A. Brookes counselled great care in their appointment. It is necessary to ensure that they are not running competitive lines and to see that they are technically qualified to handle the business. Mr. Brookes also noted a tendency towards a better appreciation of quality in electrical products.

Turkey

Commercial relations between Great Britain and Turkey are subject to special arrangements. They have for some time been handicapped by the inability of the Turks to pay for British imports on account of exchange difficulties. It has been stressed that Turkey can only buy British goods if Great Britain will purchase Turkish products; steps have been taken by the British Government to bring this about.

The country's electrical import trade has been almost wholly in the hands of Germany, with whom Turkey had a satisfactory clearing arrangement. British exports were practically negligible, although, in the last year or two, several schemes of development involving electrical plant have been taken in hand by British concerns.

Turkey is under-developed electrically, but the progress made in the past few years shows that the authorities are aware of the benefits of electrification. Some recent developments and projected schemes were mentioned in an article by Mr. Hasan Halet (Istanbul) in our issue of October 13th last.

Among them was a large power station (ultimate capacity 120,000 kW) at Chatalagzi to serve the Black Sea coal region. Negotiations were then in hand with British, German, American and Swiss concerns. Just over a week ago it was announced that the Eti Bank had signed a contract with Metropolitan-Vickers and associated firms for the erection of this station. It was stated that the contract was valued at £1,500,000 and that payment would be made from the credits granted to Turkey by this country. Mr. Halet also mentioned another large scheme for Kutahya (£2,500,000) for which tenders were being prepared.

This order follows upon a recent successful tender by another British concern—Lancashire Dynamo & Crypto, Ltd. This company is supplying about 200 motors for the process plant at a Turkish copper mine; they range from 525 HP downwards and aggregate about 5,000 HP.

Iraq

While most provincial centres of Iraq have shown initiative during the past fifteen years in promoting schemes for small generating plants, primarily to serve the requirements of the administrative authorities for farms and street lighting, it is only in the past seven years that any intensive electrical development has taken place in Baghdad, Basra and Mosul.

Total imports of electrical equipment rose from £189,972 in 1937 to £242,322 in 1938, the United Kingdom's share being £106,525 and £130,859 respectively and Germany's £25,683 and £31,795. The largest item in 1938 was electric fans valued at £29,301, of which the United Kingdom was responsible for £13,728. Imports of insulated cables amounted to £25,872 (U.K. £19,584), while those of dynamos and motors totalled £23,188 (U.K. £15,199). With the exception of turbo-alternator sets in Baghdad, the prime movers for generating sets have been heavy oil engines. Until three years ago all this plant came from Great Britain, but recently competition has been fierce and German plant has made considerable headway.

Customs duties range from 8 per cent. *ad valorem* in the case of plant to 20 per cent. in the case of lighting fittings and radio equipment. Britain enjoys no commercial privileges and only good quality goods at moderate and competitive prices will enable British manufacturers to retain the market which they enjoy and advance their position where they are at present backward, as in radio equipment and domestic refrigerators.

Palestine

Electrical development in Palestine is mainly in the hands of the Palestine Electric Corporation and the Jerusalem Electric & Public Service Corporation—both British companies. The 1938 sales of energy were over 72 million kWh in the case of the former, and about 6 million kWh by the latter. Between them they had approximately 98,000 consumers. In spite of the troubled times through which the country has passed, progress has been steadily maintained.

The course of Palestine's electrical import trade has been very irregular. It reached its peak in 1935, when the value of imported electrical machinery and apparatus (including wire and cable) was £660,000. It was lower in the two succeeding years, and in 1938 was only £364,000. Of this the United Kingdom was responsible for £203,000, the United States for £51,000, and Germany for £49,000.

Australian Electrical News

OUR Australian Correspondent reports that Christmas trade throughout the Commonwealth was excellent, sales of electrical goods being particularly good. A decided increase has been noted in the demand for electric fans, while sales of refrigeration equipment have rapidly expanded, particularly in the Sydney area where a policy of "no deposit and five years to pay" has made selling easy. Radio sales have been quiet, the boom which set in with the outbreak of war having led to a dull spell with such a large proportion of homes now equipped with a modern set. The "extra set for your kitchen or verandah" campaign does not appear to have been generally successful.

The Minister for Works in the Western Australian Government (Mr. H. Millington) who administers the Electricity Act assented to by Parliament last year, stated recently that the new regulations were to be gazetted in the near future, and would be enforced on May 1st. These regulations cover practically all workers in electrical trades and many others who are obliged to carry out certain electrical work. Licences will be divided into A, B and C grades and sales licences. An A licence will be issued to a person who has had at least seven years' experience and is competent in all branches of the trade. This will entitle the holder to carry out any class of electrical work. The B licence will cover electrical fitting, armature winding and electrical installation and will be issued to those with five years' experience who, if they comply with the regulations, may sit for an examination for any or all the sections. The C licence is intended, in the main, to be issued to apprentices, but under certain circumstances can be issued to learners. Holders can work only under supervision of an A or B licence holder.

Sales licences will be issued to persons who, by virtue of their employment, are required to do minor electrical work in the sale of appliances or equipment, and will include shop assistants in retail establishments selling electric irons, toasters and other electrical appliances, who have to fit flexible cords. An examination will have to be passed for such licence. Cinema operators will also be licensed, two years' experience being necessary and examinations being divided into five sections. No person under twenty-one years of age will be licensed in this division of the Act.

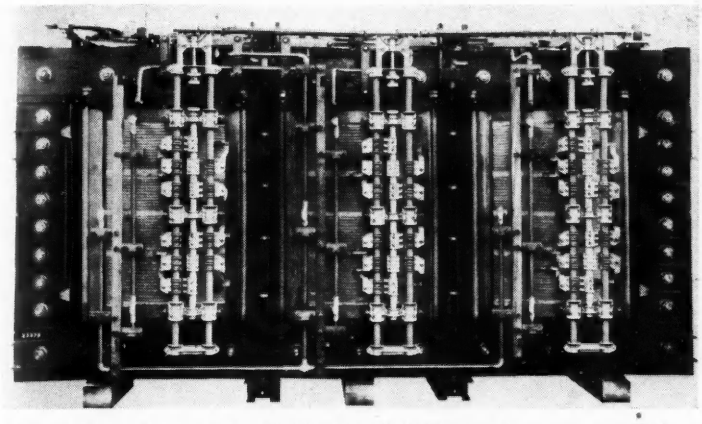
After £500,000 has been spent upon the beacon system on inter-capital commercial air routes, it has been discovered that the steel towers are causing distortion in the radio beam, and eight towers are to be dismantled and replaced by wooden towers similar to the tower at Essendon (Victoria), the only one giving complete satisfaction. As this country is pioneering the ultra high-frequency beam, such expenditure is considered justified, and has been approved by the Minister for Civil Aviation (Mr. Fairbairn).

BRITISH PLANT FOR OVERSEAS

Recent Noteworthy Developments

HOWEVER legitimate a reason for national pride it may be that so many of those discoveries and inventions that everywhere form the basis of electricity supply technique had their origin in this country, it is more to the point at this juncture to inquire how British engineers are carrying on the work initiated by their predecessors, adapting it where necessary to meet to-day's needs—also on a world-wide basis. From this may be obtained a general indication of what is likely to be the British contribution in the future, not only towards the development of existing ideas but also in originating new ones to meet the infinitely varying conditions in which electricity is supplied to the public of whatever land.

It may be said at once, that the results now being achieved—



Internal view of one of the 30,000-kVA, 11/33-kV transformers supplied to the Bunnerong Station, N.S.W.

many remarkable instances of which cannot, unfortunately, be published at the present time—provide abundant evidence that however great may be the change in the works organisation of the pioneer concerns that the evolution of the industry has necessitated, the traditions of good workmanship and ability to meet the claims advanced on behalf of their engineering products remain what they were as a supreme national asset.

It is equally gratifying to observe that more recently formed electrical manufacturing companies are no whit behind the older ones in the quality of design and skill in craftsmanship they bring to bear. Nor are major developments confined to a few companies; they are spread out over a large number, great and small. Each may have its own methods of design, but there is seemingly so little difference in the results that a large proportion of the work in hand at any time represents repeat orders, indicating a natural wish of users to continue to deal with manufacturers who obviously are concerned either to maintain or to build up well-merited good will.

Standardisation there has been, but this has always been in the direction of convenience in the production of items in which the possibilities of improvement have reached saturation point; in no sense has it discouraged the application of new ideas. In this is to be seen the influence of the British Standards Institution, which provides the British Committee of the International Electro-technical Commission, thus ensuring constant touch with developments in other countries.

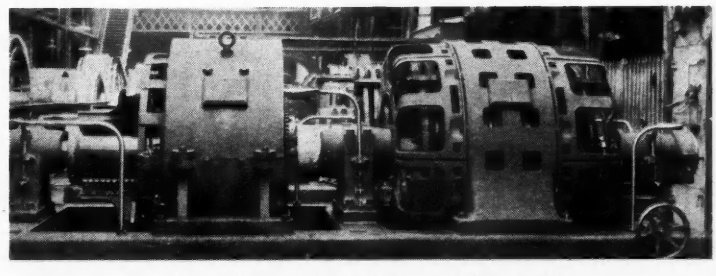
Of definitely outstanding importance is the close association in Great Britain of electro-technical problems of power supply with mechanical engineering. The bearing of this is illustrated in so electrical a matter as switchgear construction, in which in spite of the prominence given to arc characteristics, three-quarters of the questions involved are of a mechanical nature.

The impracticability of confining the scope of electrical manufacture is implicit in the title of the British Electrical and Allied Industries Research Association, which undertakes important investigations, for instance, into the creep-resisting characteristics of alloy steel at high temperatures. Such investigations are supplemented by others carried out in the laboratories of many manufacturers. Smaller or more specialised concerns without the same costly research organisations derive direct benefit not only from the work of the E.R.A. but also from the co-operative arrangements in force in the electrical industry for the pooling of experience.

An example of such co-operation is to be found in the provision made for the type testing of switchgear to a standard approved by the National Physical Laboratory, at the four stations of the Association of Short-circuit Testing Authorities. These are recognised as furnishing the most complete facilities for simulating operating conditions that have yet been provided in any country. They are also equipped for detailed study of the characteristics of arc and related phenomena. Finally, there is the effect of the national grid in providing experience of inestimable value in the provision of plant for high-voltages and large capacities.

So much for the background against which nearly 200,000 people (including a large majority of the 20,000 members of the Institution of Electrical Engineers as well as those catered for by other technical bodies) are engaged in electrical manufacture. Reason for optimism for the future may be found in examples of heavy engineering either on order for or recently installed overseas, in addition to that absorbed by the home market. So typically British an invention as the steam turbine is well represented by two 50,000-kW turbo-alternators built for Bunnerong (Sydney) one of which is now in commission. This happens to be the first 3,000-RPM three-cylinder machine for this output constructed in Great Britain, but even larger machines at the same speed are going through the shops, while sets of double the output (the largest in Europe) have been or are to be installed in this country, where boilers of both natural and forced-circulation types are being built for pressures up to 2,000 lb., with superheaters withstanding temperatures as high as 965 deg. F. Indeed, as long ago as 1931 a 10,000-kW turbine was built for export to the United States to operate at 1,000 deg. F.

A large number of other 3,000-RPM turbo-alternators ranging from 20,000 to 40,000 kW have either recently been or shortly will be sent overseas. These are merely representative of a few of the most striking of the exhibits of steam turbines whether of the reaction, impulse or double-rotation type. There are many more smaller machines, especially of the self-contained, geared and pass-out types, which, together with auxiliaries for all sizes, testify to the merits of British engineering abroad. Another British development, high-voltage generation, is exemplified in two of 40,000-kW 3,000-RPM sets for Capetown with alternators wound for 33-kV. The same



Conversion plant of a type supplied to India

voltage has been chosen for large new machines for Calcutta, Brisbane, the N.S.W. Railways, Newport A of the Victorian Railway Commissioners and Congella (South Africa). Experience with high-voltage stators built by several firms have proved their unquestionable reliability. Alternators of all voltages are designed to be proof against short circuit and insulation has been made moisture resistant.

Regarding the boiler house, uninterrupted runs increase in length partly due to the trend towards a low heat release per cu. ft. of combustion chamber. Retort-type stokers are available for evaporating up to 600,000 lb. per hr. and chain grates up to 350,000 lb. per hr., while designs for burning

waste and refuse fuel form the subject of continued inquiries.

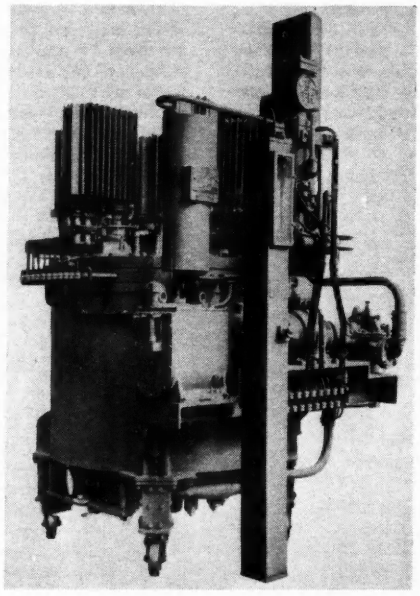
Activity is also reported by manufacturers of hydro-electric plant. An important contract awarded last year was for the complete generating scheme for two stations on the River Liffey, near Dublin, comprising two 25,400-HP turbo-alternators in one and a 5,750-HP set in the other, which is controlled from the first. Remote supervisory and automatic operation is a feature of this class of work and is to be found also in connection with two 28,000-HP units for the Waikeroma power station and one of 36,000-HP for the Highbank station, both in South Island, New Zealand. The foregoing are of the vertical reaction type running at from 187.5 to 333 RPM under heads of from 50 to 360 ft., but for the 940-ft. head of the Tasmania scheme a four-jet horizontal impulse design is embodied in two 21,000-HP 428-RPM turbo-alternators under construction.

During the past year two 23,000-HP vertical generating units have been erected at Waitaki, New Zealand, and two 24,000-kVA 214-RPM "umbrella" type alternators at the Arapuni station in the same Dominion. Four umbrella alternators have also been under construction for Finland; these are rated at 30,000 kVA at 100 RPM and are, we believe, the largest machines of this kind yet built in Britain, the rotating parts alone weighing 250 tons. This equipment includes small 60-pole alternators with permanent magnets for the governor drives.

Steady progress has been made in the increase of power output per unit weight of Diesel engines, partly due to supercharging and improvements in scavenging methods. The reliability of this type of engine is indicated by their popularity in remote spots abroad where maintenance is difficult. A 3,500-HP generating set for Bermuda is representative of larger sizes, while Diesel-electric locomotives for shunting purposes or for low traffic densities illustrate another field for export. More 200-HP rail cars for Ceylon and motor coaches for the Bombay, Baroda and Central Indian railway and the putting into service of 480-HP locomotives in Brazil provide recent examples of such tendencies.

More than one method has recently been developed in Great Britain during the past few months for protecting transformer windings against the effects of transmission line surges due to lightning, while another aspect of the lightning trouble is represented by arc-suppression (Petersen) coils, which are now made by several British concerns for installation abroad as well as at home.

Exports are forming a substantial proportion of the total transformer output. The largest shipped last year of which we have record formed part of an order for four 30,000-kVA ON/OB five-limb 11/33-kV three-phase units for Bunnerong (Sydney). Other notable deliveries for Australia within the past few months have been two 12,500-kVA transformers for 132/66/11 kV and two of 5,000-kVA at 11/66 kV with overload tap changing, as well as thirteen large 6.6-kV induction voltage regulators for the Victoria Electricity Commission. A 1,000-kVA through-put booster regulator and exciting transformer in the same tank for operating at 4,000-V three-phase has been built for Canada, and two three-phase 19,000-kVA, 33-kV, 3 per cent. reactors for Australia. Prominent amongst the orders from Canada were those for a 3,000-kVA 121/46-kV single-phase transformer and six 15,000-kVA 26/4 kV three-phase units and from New Zealand three 6,000-kVA 21/66-kV three-phase units. South Africa and India have also presented good markets for transformers, especially in sizes up to 500 kVA.



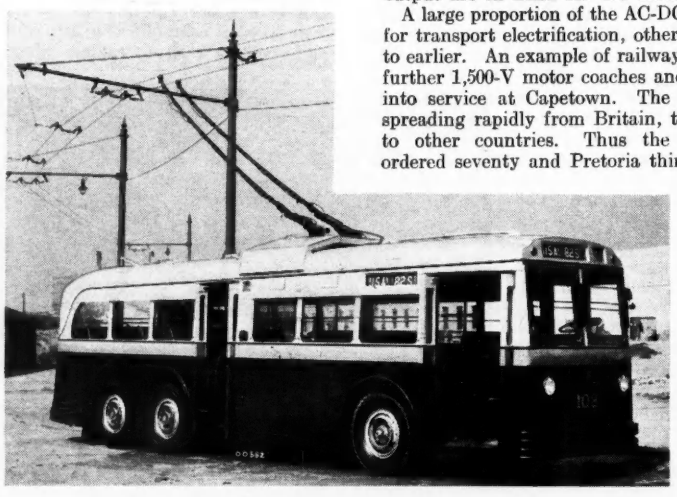
Grid-controlled steel rectifier (15,000-kW, 1,500-V) for overseas railways

While oil-filled metal-clad switchgear still retains first place in England, there has been a tendency to reduce the oil content where practicable without detracting from operation performance, and recent developments include air circuit-breakers for 3.3-kV up to 100 MVA and for medium voltage up to 35 MVA. The use of special alloys has minimised the weight of moving parts, thus substantially contributing towards the quicker breaking (*e.g.*, 3 cycles total) now obtainable with high-voltage and large MVA ratings. Good reports are received of the pneumatic and spring-closing mechanisms now available. Typical overseas contracts for indoor gear have been nineteen 1,500-MVA and eight 750-MVA 22-kV metal-clad equipments for Bunnerong extensions (repeat order), 11-kV equipments up to 350-MVA for Ahmedabad (India) and seventy-two 33-kV oil circuit breakers for the Victoria Falls Co. Outdoor high-voltage equipments in hand include a number for Ceylon and New Zealand.

The past year witnessed no falling off in the demand from abroad for rotating plant for converting from AC to DC of up to 1,500 kW, Australia and India being the largest purchasers. Mercury-arc rectifiers, likewise, have been built in increasing numbers. The water-cooled steel tank still holds its own at 3,000 V and above, but at lower voltages glass bulbs and pumpless air-cooled steel tanks are strong competitors. The last named, relatively newcomers, are being built for installation in Greece, Scandinavia and Argentina as well as for India and the Dominions. Cylinders giving 1,000 A each with overload ratings are available with or without grid control.

Some 15,000 kW of the glass-bulb type is now being despatched to the Buenos Aires Western Railway; two of 1,000-kW were lately sent to Bombay for the tramways and two of 1,800-kW (1,600 V on the D.C. side) to the New Zealand Government Railways. Other orders completed were for the Edmonton tramways (Canada) and for copper mines in South Africa, Penang Railway and Capetown tramways. Water-cooled rectifiers for 3,000 V output, in units up to 2,500-kW with grid control for over-compounding and suppressing back-fires, are being installed at Johannesburg, and in 1,500-kW units for the N.S.W. Railways. Four more grid-controlled rectifiers for either forward or inverted working at 3,000-V output are in hand for the Natal railway.

A large proportion of the AC-DC conversion plant is required for transport electrification, other than Diesel-electric referred to earlier. An example of railway work was that of the twelve further 1,500-V motor coaches and twenty driving trailers put into service at Capetown. The vogue of the trolley bus is spreading rapidly from Britain, the scene of its development, to other countries. Thus the Johannesburg municipality ordered seventy and Pretoria thirty-four vehicles while Capetown and Durban and Shanghai placed repeat orders. Others exported to Edmonton (Canada) had 135-HP motors, the largest capacity yet, we believe, for single-deckers.



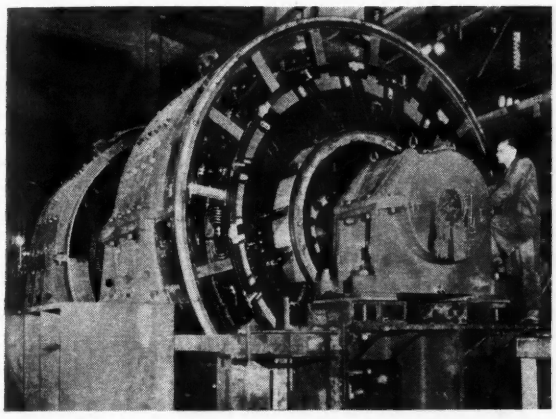
Trolley-bus designed for operation in Canada

Rolling mills, such as the 21,000-HP (peak) reversing blooming mill drive and the 20,000-HP (peak) three-high rail-mill drive for Australia, have provided further heavy demands for DC motors with Ward Leonard control. Two reversing equipments of similar horse-power driving blooming and finishing mills have also been completed for India. Another DC drive for export is a set of three 2,000-HP and one 500-HP motors for an 18-in. bar mill which has just been commissioned. In one installation recently started up in Australia, while the hot and cold sheet mills are driven by 1,250- and 500-HP induction motors, a

DC 250-HP motor is employed for a temper-pass cold-sheet mill. During the year reversing drives for push benches for seamless tube manufacture have been set to work in Australia and South Africa. Another interesting export order includes the provision of duplicate 375-RPM squirrel-cage motors for lifting the tables on each side, and two more for reversing the chains, on each table of three sheet mills. These have been tested for forty reversals per minute with 167 deg. F. rise in temperature. A number of orders have been completed for non-ferrous mills, one of which requires some 1,325 HP (continuous rating) of motors for driving breaking-down, sheet and strip aluminium mills.

In electric winding also, DC finds an undiminished outlet. An important order has been secured for the complete equipment of two winders for Northern China each direct-driven by a 3,000-HP, 54.8-RPM motor, the speed of the AC motor driving the Ilgner flywheel generator being slip-regulated between 820 and 670 RPM. Equipments of the Ward Leonard and Ilgner types were also supplied to the Rand, Victoria, India, West Africa and Portugal, the first named having a peak HP of 7,800. A number of contracts for AC winders are also being executed, chiefly for South Africa and Australia, one for the Rand Mines requiring a 3,390-HP (peak) motor. Many of these incorporate dynamic braking and overwind protection devised by the electrical manufacturers.

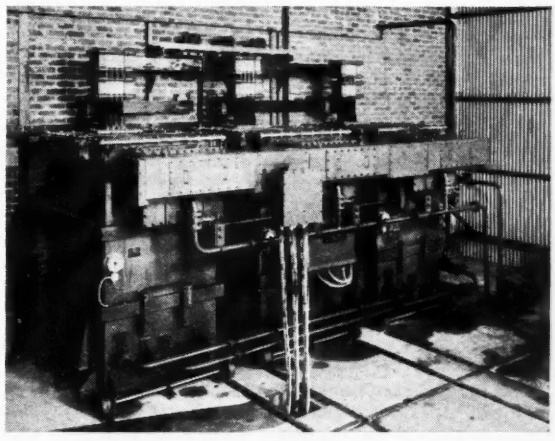
The fulfilment of orders for smaller motors, AC and DC, for all manner of purposes abroad has been a major activity in the electrical industry and we have evidence that there are very few parts of the globe to which they have not been sent within the last twelve months. The individual duties of



Two coupled 3,000-HP, 54.8 RPM DC winder motors for China

these are too numerous to specify; thus one order from Australia was for 4,000 HP of motors in connection with the paper trade and a second was for 5,000 HP, total, for a Turkish copper mine. Machines supplied have included several designed to meet extremes of temperature and of moisture and for use in explosive atmospheres. Attention should be drawn to the new woven-glass insulation which offers advantages for severe operating conditions.

The scope of the AC motor for variable-speed work has been increased by the introduction of a commutator machine in



Transformers for a 3,600-kVA arc furnace for South Africa

conjunction with a double induction regulator. Another recent design permits of a wide variation of controlled speed and hence accurate levelling for lift work, with silent working, for which there has been a demand in Australia, New Zealand, and South Africa. The term "motors" must be understood to include control gear which has been devised to meet the most exacting requirements.

Valuable experience has been gained during the course of rearmament in the development of electric furnaces for melting, refining and heat treatment, which is now at the service of users. An example of recent construction is a 3,600-kVA arc furnace recently installed in South Africa, the largest we believe in that continent.

While some idea of the scope of British electrical enterprise may be gained from a few striking examples drawn from various parts of the world, it must be remembered, in order to ensure a proper perspective, that the more numerous "bread and butter" products, which do not lend themselves so readily to apt illustration, are certainly of at least equal importance in Empire and foreign trade and also in maintaining, as they do, the national reputation. In this category we can include domestic appliances of which there is an extremely wide range of all types, cables, searchlights and heavy-current generators.

Some measure of the confidence inspired by results is shown by the number of cases in which the electrical manufacturer has been appointed as the main engineering contractor. In view of the frequent predominance of electrical apparatus in the whole installation, it is safe to predict an extension of this policy.

Anglo-French Co-operation

Terms of Agreement

LAST week's discussions between representatives of the Federation of British Industries and the Confédération Générale du Patronat Français, which were conducted with the approval of the British and French Governments, resulted in an agreement upon matters of principle, the main points of which are as follows:—

It is recognised that the collaboration between French and British industries in everything which concerns the military effort of the Allies is effectively directed and controlled by the Ministère de l'Armament and the Ministry of Supply respectively, between whom the closest collaboration already exists. French and British industry place their whole resources behind this joint effort. The question of reciprocal trade between France and Great Britain has recently been the subject of a satisfactory agreement between the two Governments.

The two parties, being determined to support the common objective of the two Governments, are primarily concerned with developing co-operation for the purpose of promoting the common interests of both countries in the export markets of the world. The necessity for increasing the export trade of the Allies during the war and afterwards is vital, both for the success of the military effort and for the economic welfare of the peoples of the two countries. In order to comply with Allied policy, it is recognised that it will be necessary to restrict home consumption in certain directions in order to make possible an expansion of export trade.

The ultimate aim to be attained is that export trade should be so conducted as to ensure a fair return for producers with full regard to consumer interests.

The two organisations undertake to promote agreements between individual industries of their respective countries, designed to encourage co-operation, to eliminate uneconomic competition wherever occurring, and to maintain such a price level in the respective export markets as will ensure the development of consumption.

They are agreed that negotiations should be undertaken as soon as possible between individual industries, not only to promote co-operation during the war, but also to serve as a permanent feature in economic relations between the two countries. The wider the area of industry included in such agreements, the more rapid will be the expansion of export trade during the war and the restoration of sound trade afterwards.

The organisations agree to support each other reciprocally in maintaining their existing markets, and generally in developing their export trade during the war. They are accordingly prepared to recommend to their respective Governments that in suitable cases productive capacity, at present allotted to armaments in one country, should be released for the export

trade of that country by the importation of the armaments so displaced from the other country. Wherever possible, imports should be obtained from their respective countries rather than from third countries. It is essential to eliminate Franco-British competition in the purchase of raw materials and to secure an equitable supply of such materials according to the needs of the two countries.

The two delegations have decided to constitute themselves into a permanent Anglo-French Industrial Council which will maintain and develop the relations established by the agreement, and take the requisite action thereon from time to time. The first task of the Council will be to investigate the extent to which individual industries in France and Great Britain are in a position to enter into negotiations on matters of common interest, and to arrange for such negotiations and also for discussions involving complementary industries.

The two organisations consider that their common objective in post-war economic policy must be the rapid re-establishment and expansion of international trade, which alone can form the basis of enduring peace, with a development of consumption resulting in a fuller exchange of commodities. This will enable the consumer to obtain better and cheaper products, and the manufacturer to keep his workers employed. This result can be better achieved by co-operation between industrial groups rather than by unrestricted competition.

The two organisations express their desire and intention of securing as soon as possible participation in this policy by other countries.

The Export Council

Points From the White Paper

IN our last issue we made brief reference to the White Paper in which the Export Council set up by the President of the Board of Trade (Sir Andrew Duncan) with himself as chairman, stated its aims and plan of work. The following is a fuller version of the document.

The Council approaches its task from the standpoint that the maintenance of export trade is so vital a factor in the war effort of the Allied Powers that no measure calculated to contribute to the end in view should be excluded from consideration. Nevertheless, there are powerful reasons why the strongest preference should be given to measures which involve the least interference with the existing channels of trade or with established practices and principles.

Accordingly, the first aim of export industries and merchants as well as of the Export Council should be to secure such adjustments of the machinery created to deal with the wartime economic responsibilities of the State as will effectively overcome impediments to export trade. Further, it is essential that exporters should receive direction, guidance and support from the central Government to a degree never contemplated under peace conditions. If export trades, including both manufacturers and merchants, are organised or will organise themselves so as to make it possible for them to work with the Export Council in securing the necessary adjustments in the wartime machinery of trade and so as to profit effectively from the direction, guidance and support which the Government is ready to give, the general situation internally and externally is such that the Council is confident that a substantial increase of exports can be achieved. Should exceptional circumstances arise in particular trades or over the whole field, the Council places no limit to the expedients it would be prepared to consider.

At the same time the Council emphasises that for reasons of limitation of supplies, if for no other, the export trade necessary to win the war can only be achieved by some diversion from the home market. In this way the home consumer, no less than the manufacturer and the expert merchant, can make a direct contribution to the war effort of the nation.

Each industry in considering export development has problems of raw materials, prices, distribution and markets which are highly specialised. The Export Council therefore regards it as vital that there should be an Export Committee or Group in individual industries. The Council will co-operate with such Groups, and delegate to them the detailed work with individual firms which is involved in the national export drive. Existing trade organisations and Chambers of Commerce will, it is hoped, take the initiative in forming these Groups, but affiliation to the Group must be open to all on equal terms. The collaboration of the interested export merchants in the work of Export Groups will be most important.

An Executive Member of the Council will personally discuss with each Group the main lines of the wartime export policy of its trade. The questions which arise may include considerations relating to particular markets, foreign exchange, political and commercial relations, and questions of economic warfare. A liaison will be organised between the Group and the Board of Trade for supervising the day-to-day operation of the agreed measures, and, where necessary, machinery will be created to deal with the allocation of raw materials for export orders under plans worked out with the Ministry of Supply and the appropriate Controllers. To achieve satisfactory results the Council must deal with any trade as a whole; or as nearly as possible on that basis. That is not an easy matter to arrange in every case and there are a number of facts and figures which have to be assembled before practical discussion with an Executive Member of the Export Council can usefully be started, but the Council is willing to give immediate guidance as to the formation and conduct of Export Groups to any organisation that approaches them.

The Council is also examining a number of plans and suggestions for the promotion of export trade which will have the object of conferring a benefit or stimulus on export trade in general. Under this head may be mentioned such activities as publicity, propaganda on behalf of United Kingdom trade, market information and joint marketing. In addition, it hopes to examine with the co-operation of the appropriate authorities, suggestions relating to such matters as barter arrangements and trade negotiations, insurance facilities for export trade and a number of points bearing on the essentially practical problems of firm delivery dates and prices.

GERMANY'S ELECTRICAL MARKETS

January—June, 1939

CLASS	VALUE (1,000 Rm.)	PRINCIPAL CUSTOMERS
Dynamos, motors, convertors and transformers, up to 500 kg	9,200	Holland, Scandinavian and Baltic countries, India, Belgium, Argentina and Brazil.
Do., over 500 to 3,000 kg.	3,390	Rumania, Brazil, Yugoslavia, Chile and Bulgaria.
Do., over 3,000 kg. ..	3,967	Brazil, Rumania, France, Finland, Egypt, South Africa and Afghanistan.
Cables	9,640	Sweden, Holland, Finland, Rumania, Greece, South Africa and India.
Accumulators, plates, etc.	2,522	Holland, Chile, Turkey, Argentina and Finland.
Measuring and recording instruments.	10,325	Sweden, Holland, Great Britain, Italy, Belgium, Argentina, Turkey and Russia.
Metal-filament lamps ..	4,210	Denmark, Italy, Sweden, France, Turkey and Chile.
Telephone material ..	9,580	Holland, Italy, Greece, Finland, Brazil and Uruguay.
Radio equipment	16,410	Sweden, Hungary, Holland, Japan, Yugoslavia, Finland, Spain, Turkey and Brazil.
Safety and signalling apparatus.	2,870	Holland, Japan and Argentina.
Ignition apparatus, etc. (excl. magnetos) and elec. accessories for motor vehicles.	6,840	Sweden, Italy, Hungary, Great Britain and France.
Apparatus for lighting, power transmission, electrolysis, resistances, etc.	33,480	Sweden, Holland, Finland, Italy, Argentina, Belgium, Yugoslavia, Great Britain and India.
Lighting and starting apparatus for motor vehicles, etc.	1,560	Details not available.
Armatures and commutators.	1,790	
Electric irons	360	
Heating and cooking apparatus.	4,830	
Galvanic batteries and parts and heating elements.	1,380	
Telegraph and telephone insulators.	1,415	
Electro-medical and dental apparatus.	6,620	
Insulating conduit.. ..	650	
Total all classes ..	156,030,000 Rm.	

INSTITUTION PROCEEDINGS

Medium-voltage Oil-less Switchgear. Research in Cable Fire Risks Electric Shock Effects

Oil-less Switchgear

AT the meeting of the Institution of Electrical Engineers in London on March 7th the paper advocating oil-less metal-clad switchgear for AC up to 660 V, three-phase (to which reference was made in last week's issue) was presented by Messrs. H. E. Cox and L. Drucquer (British Thomson-Houston Co., Ltd.).

Mr. J. O. Knowles (Brookhirst Switchgear, Ltd.) opened the discussion by expressing his satisfaction with the developments described by the authors, but said he hoped they would not allow their enthusiasm to spread to the use of low-voltage circuit-breakers of 4,000 A and 50,000 kVA. There was a difference between a thing that could be done and a thing that was desirable, and in his view such currents and such rupturing capacities at low voltage were not desirable. Another matter which needed clearing up was the thermal capacity on overloads, for it was not desirable to contemplate that low-voltage breakers should remain untripped for periods up to 5 seconds. It was not wise from the personal accident point of view, since such gear was commonly installed in close proximity to personnel. The position as between thermal and magnetic trips was not easily solved; they were still running a race together. Had the authors any particular views as to the relative merits of rolling and sliding of contacts? When switch-fuses were run too close to their minimum fusing current they were not good neighbours for butt contact switches. He did not want to decry the switch, but to warn users.

Mr. A. R. Blandford (English Electric Co., Ltd.), while commenting that the subject matter of the paper was a commendable step in the right direction, suggested that the authors had been a little timid in stating their views definitely. Indeed, he had almost got the feeling that they felt they must not be too definite because they had a very good oil circuit-breaker round the corner. This latest development of air circuit breakers was not a cycle of fashion. Actually it was being forced on them by circumstances. A well-designed air breaker could readily go through its complete B.S.S. short-circuit duty, and more, without requiring any attention and air breakers for up to 3.3 kV were now in commercial use.

Long-felt Need

Mr. J. W. Leach (Central London Electricity, Ltd.) said his experience in a densely loaded area confirmed that short-circuit values of 25,000 kVA had to be dealt with. A breaker which would meet that duty in association with high-rupturing-capacity fuses for the distribution network, and cut-outs on consumers' premises, would fulfil every condition likely to be met for a very long time ahead. The type of breaker described in the paper met a long-felt need; it was something quite new and required only a small space, which was important in densely loaded areas. How close earthed metal could be mounted in front of such a breaker had some bearing on the use of the compression type of dashpot, which had been developed and used successfully by his own staff.

Mr. R. T. Lythall (Johnson & Phillips, Ltd.) said he was particularly pleased that in the introduction to the paper the authors had again drawn attention to the relation between MVA and voltage in determining the severity of duty. The inability of many users to think in terms of current indicated that the present B.S.S. 116, and the new low-voltage specification now in course of preparation, could with advantage be reduced to terms of current. The type of gear described in the paper could, with considerable justification, be used in distribution work to the exclusion of many oil circuit-breakers. It had considerable possibilities; indeed, they were such that in the course of a few years oil circuit-breakers would largely disappear. At the same time, it was necessary that users should fully appreciate the difficulties surrounding high breaking capacity at low voltages and be prepared to meet costs which they had not, in the past, been accustomed to do. The authors' designs were not cheap.

Mr. W. A. Coates (Metropolitan-Vickers Electrical Co., Ltd.) remarked that without depreciating the work of the authors it could be said that they had not introduced anything new, in detail or fundamental features. They had applied science to the problem of air breakers for lower voltages in a very clever and effective manner. A few years ago he was asked to develop a low-voltage breaker for use in their own factory. Something was designed which cost a good deal of money and an endeavour was made to ascertain what demand there was likely to be for it generally. The conclusion arrived at was that there would not be sufficient demand for small current ratings with big breaking capacity to justify development. The compression type dashpot interested him very much.

Mr. C. J. O. Garrard (General Electric Co., Ltd.) remarked that this paper was an example of the way in which nowadays the design of almost all electrical apparatus was governed by transient and not stable conditions. Most difficulties were due to lack of foresight on low-voltage networks in the early stages. The plan adopted by the authors was being followed by the majority of switchgear manufacturers. He wondered whether too much fuss was not being made about fire risk with oil circuit-breakers, as he did not know of any instance in which the oil in the breaker (as distinct from the oil in bus-bar chambers) had been directly responsible for a serious fire, or even a serious contributory factor to a fire. The oil circuit-breaker was a cheap, reliable and compact piece of apparatus, and if it was backed up by proper precautions he did not believe it would cause a fire. Moreover, its dimensions were smaller than those of air breakers. It was time for a greater degree of standardisation of electrical apparatus in this country, to remove redundant designs, especially as in the future there might be shortage of materials. Much trouble could be avoided by distributing at higher voltages which would obviate the necessity for burying such a huge amount of copper in the ground.

Avoiding Two Voltages

Mr. H. E. Cox, replying, agreed that technically 5-second ratings were undesirable and anyone who bought such apparatus usually got a rather unsatisfactory arrangement. But certain loads were more economically catered for at 440 V and heavy ratings of 4,000 A and 50 MVA avoided wiring industrial establishments for two voltages. So long as there were not too many of those heavy circuits they were the economic way of carrying out the job, and the industry would have to face that fact. Thermal trips were much more universally applicable than the magnetic trip; rolling contacts did not really mean anything at all, but sliding contacts had a very good function to perform; they sheared off all the little blobs on the copper, broke up the oxide and made a good surface. As to lining the covers of breakers, earthed metal could be brought within 4-in. of the front with perfect safety. The arcing contacts up to 800 A relied upon wipe and pressure, but the main contacts had strips of silver about $\frac{1}{16}$-in. thick. A very simple structure could deal with 3.3 kV without resorting to blow-outs and de-ionising.

The compression type dashpot was actually suggested to the authors by Mr. Leach himself in order to overcome a certain difficulty of discrimination, and it seemed to fulfil its purpose very well. Its band of error had not been investigated fully yet, but it satisfied the B.S.S. requirement.

Mr. L. Drucquer replied to a few other points.

Cable Fire Risks

FIRE risks associated with cables were discussed in a paper by Mr. S. W. Melsom (Cable Makers' Association) which was read before the Transmission Section of the Institution of Electrical Engineers in London on March 13th. Recent investigations, he said, had indicated the smallness of the risk due to faulty cables, while showing the need for some protection against the destruction of cables by oil fires of short duration as well as against an extraneous fire spreading along cables themselves.

The first section of the paper related to cables entering generating and distributing stations, with references to the Electricity Commissioners' recommendations on the subject. The protective means favoured in these cases was the application of moulded asbestos, which was obtainable from its manufacturers in the form of split tubes for clamping around exposed lengths of cable. This material was said to possess (to the best degree obtainable) the requisite thermal characteristics. Where room was not available in existing installations suggested alternatives were to apply protective wrappings of the kinds and in the manners indicated in the paper.

The second section dealt with cables without exterior metal protection, in especially risky situations and for switchboard connections, &c. A new type of dielectric was described which was of itself fire-resisting, being a rubber-like syn-

thetic "mix." Dimensions and installation procedure remained unchanged, such cable being just as flexible as the ordinary rubber-insulated type and required no more protection at its ends than was normally given. The newer variety could be made of smaller diameter and manufactured at a faster rate.

The third section of the paper described an important series of tests made in close collaboration with the Electrical Inspector of Mines under conditions as nearly as possible simulating those obtaining in collieries. These experiments showed how difficult it was ordinarily to set fire to cables and also their ability to withstand such transient flames as would be caused by an explosion of fire-damp.

In the case of mine trailing cables tests had been made in some cases under conditions much more severe than could occur in practice. They had indicated that, to secure the maximum degree of safety from fire due to internal faults, a fire-resisting type of dielectric might be desirable and that special provision might be necessary both for screening and earth-leakage protection.

The paper concluded with a note on a cold-pouring compound which was also cold-setting and which, though not fire-resisting, had recently come into prominence for emergency repairs and rapid cable-jointing in circumstances precluding the use of heat.

Insulation and the Chemist

LITTLE real progress would be made in the development of new insulating materials to satisfy the ever-increasing demands of electrical designers until chemists appreciated the physical significance of electrical properties. This was the opinion expressed by Mr. L. Massey when addressing a joint meeting of the Plastics Group of the Society of Chemical Industry and of the Institution of Rubber Industry in London on March 11th.

Primary properties might ultimately be defined in terms of the motion of particles carrying a charge of electricity. Most dielectrics were complex compounds of variable constitution, and the behaviour of atoms, valency links, molecules and chemical groups enabled one to deduce certain broad generalisations linking chemical and electrical conceptions. It was only through knowledge of these generalisations that the research chemist might hope to develop new dielectrics. The process chemist was faced, in addition, with the difficulty that the electrical behaviour of any material of inherently good properties depended upon its freedom from impurities. The effect of the various classes of impurity which were of practical importance needed to be understood.

Despite the complex nature of common electrical insulating materials, correlation of electrical and chemical properties was possible in a broad sense. The insulation chemist should be competent to choose materials for particular applications, to control factory processes involving chemical principles, to trace the origin of service trouble, to analyse materials and to synthesise them for new developments. He would achieve competency in one or more of these fields only when he took the trouble to appreciate the fundamental principles upon which electrical properties depended.

Discharge Lighting Characteristics

IN a paper which was read at a joint meeting of the Association of Supervising Electrical Engineers and the Institution of Engineers-in-Charge in London on March 5th Mr. R. O. Ackerley (G.E.C.) summarised those electrical characteristics and qualities of the light emitted by discharge lamps which had a direct bearing on the employment of lamps of this sort. For instance, apart from greater efficiency, they caused sharper definition of objects and greater acuity of vision. An exact explanation was hard to find, but it was probably the effect of limitation of colour radiation reducing chromatic aberration. This advantage was generally accepted, combined with the energy saving, as an inducement for the adoption of the high-pressure mercury electric-discharge lamp for many industrial situations. A calculated example showed how these lamps not only reduced the kWh consumed, but also the installed load, subject to kVA charge, as well as maintenance due to longer lamp life.

It was worth bearing in mind that a reduction in watts dissipated in lighting meant a corresponding reduction in heat to be taken care of by any air-conditioning plant.

To reduce stroboscopic flicker where moving machinery was involved, the ideal system was to have adjacent fittings on different phases in all directions so that three out of every four fittings forming a square were on three different phases, but this might be costly from the wiring point of view and it was usually sufficient to have adjacent lines of fittings on different phases. It was desirable, however, to determine the direction of such lines in relation to the layout of machines.

Fluorescent tubes combined really good colour quality, either in suitably mixed groups of tubes or more recently in single tubes, with high overall efficiency for specialised industrial applications. Notable examples were the gauge rooms of aeroplane factories where intricate work involving the very accurate checking of gauges had to be carried out continuously under artificial light. The tube combinations were selected to give a stimulating sunshine effect and the evenness and shadowlessness of the illumination was such that at no place was the intensity greater than 31 or less than 29 ft.-candles and the variation as an operative moved to or from his bench, due to his own shadow, was only one foot-candle. These rooms had to be kept at a constant temperature and the tubes reduced the load thrown on the air-cooling plant while the even distribution of heat over a large area prevented the formation of hot spots.

Up to six tubes could be placed in series on a single high-voltage transformer. For certain types of decorative and commercial lighting they were ideal, but the watts consumed and, therefore, the light output per foot of tube was small, which meant that long tubing was needed to light any appreciable area to the intensity required in specialised processes in a factory.

Checking Protective Gear

METHODS of testing and setting protective gear on site were discussed in an illustrated paper by Mr. A. J. Haselfoot at a meeting of the London Technical Group of the Electrical Power Engineers' Association on March 5th, Mr. H. Bourne presiding. The author considered instrument transformers, connections, relays and tripping circuits, the circuit-breaker itself being outside the scope of the paper.

For checking directional relays or distance protection, a convenient testing set was designed to give various voltages and currents at different power factors, making it possible to simulate various types of faults and to observe the behaviour of the relays. The most satisfactory method of testing some forms of interlock protection was to use two such sets, one at each end of the feeder, connected to the auxiliary 400 V source through contactors, the coils of which were paralleled through a spare pilot core, or through one of the primary conductors, so that they could both be operated simultaneously. The voltages and currents at each end were adjusted to simulate various faults, internal or external to the feeder, and the two test sets were switched on together. By that means the time taken to receive a stabilising signal from the far end of the feeder could be compared with the time taken for the relays to trip the switch in the absence of such a signal.

Effects of Electric Shock

SOME of the effects of electric shock on the human body were outlined in a paper presented to the South Wales Branch of the Association of Mining Electrical Engineers at Cardiff on March 9th. The joint authors were Messrs. S. W. Fisher and C. M. Harvey (H.M. Medical Inspector of Mines and H.M. Deputy Electrical Inspector of Mines respectively), who did not claim to offer anything original.

The effects of the passage of a sufficient current through the body had been summarised as asphyxia due to muscular contraction; fibrillation of the heart muscle; paralysis of the respiratory centre; simultaneous failure of the heart and respiration; and injuries to tissues by burning. The authors said that asphyxia might be produced by contraction of the respiratory muscles so as to prevent breathing, the heart continuing to beat for a little while. If such conditions persisted, unconsciousness would take place very quickly due to lack of oxygen. It was, therefore, of the utmost importance to switch off the supply or remove the victim from contact and to commence artificial respiration with the least possible delay.

Fibrillation so altered the regular rhythmic action of the heart that total irregularity of the pulse resulted; no two beats were alike in force or rhythm and in a severe case the pulse might not be felt. Stimulation of the heart by massaging under the ribs and the left side of the chest should be done, in addition to the administration of oxygen mixed with CO_2 and artificial respiration. Fibrillation appeared to be caused by comparatively small currents at 200 to 500 V.

The respiratory centre was a small area in that part of the brain which controlled breathing; when this area was destroyed all rhythmical respiratory movements ceased. Contact at high voltages apparently resulted more often in paralysis of this centre than in heart failure.

With AC at 50-60 cycles the "threshold of perception" (*i.e.*, the minimum value at which the senses could record any effect) was 1 mA. The "threshold of decontrol" (*i.e.*, the value at which the victim ceased to have control over his muscles) was 15 mA. The "threshold of danger to life" (*i.e.*, from failure of heart, respiration, or both, was given by Zim-

mern as 25 mA. The "threshold of fibrillation" was approximately 100 mA.

The most dangerous path for the shock current was that between the head and feet, or hands and feet. A shock passing through the body from one foot to the other normally did not produce fibrillation. For shocks lasting one second or more the threshold current for fibrillation at 25 cycles was 25 per cent. greater than at 60 cycles, and at zero frequency (DC) five times that at 60 cycles. Very brief shocks lasting 0.1 second or less rarely produced fibrillation As shock current increased the danger to life increased up to about 6 A, after which it fell. Comparatively heavy currents might pass through the body without serious effect upon the heart or respiratory system, but would have serious effects upon the tissues.

The authors referred to experiments with "counter shock" and said that sheep in a state of fibrillation produced by a shock of normal intensity in the majority of cases revived by the application of a second shock of higher intensity and very short duration. It was concluded that the second shock caused the heart to stop momentarily, after which it resumed its normal beat.

Medical men, however, generally regarded "counter-shock" as most dangerous, because it might have the effect of stopping the heart completely. A heart suspected of fibrillating might be beating rhythmically, but very feebly.

Artificial respiration could be applied with the exercise of a degree of skill easily acquired by any men trained in ambulance work and possessing patience and a cool head. Time was by far the most important factor in determining whether a man's life could be saved or not. The majority of shock accidents in mines occurred at the coalface, and valuable minutes were lost by the man's mates crawling down the face to the gate-end to switch off. Remote control of coalcutters was an advantage, since switching off the machine made the trailing cable dead, otherwise an effort should be made by using dry timber or clothing to detach the victim from the cable by which he was held. Every moment he was in contact reduced the chances of resuscitation.

Once the victim was clear, artificial respiration, together with the administration of oxygen mixed with carbon dioxide, should be commenced at once and sustained for four hours if necessary, or until the arrival of a doctor, using either Schaeffer's or Sylvester's method. The former was generally considered the easier to apply underground. In all cases the patient should be kept warm and absolutely quiet until definitely under the continued observation of a doctor at the patient's home or in hospital.

In the Courts

Tubular Lamp Patent Action

IN the Chancery Division on March 6th the hearing was continued before Mr. Justice Bennett of the action brought by Mr. Hermann Mayer and Ismay Boro Tube Light, Ltd., against Evenlite Tube Lamp Developments, Ltd., and J. Lyons & Co., Ltd., for an injunction to restrain both and each of the defendants from infringing Mr. Mayer's letters patent No. 409953 for an "Improvement in or relating to electric incandescent lamps of tubular form." The second plaintiffs sued as the exclusive licensees under the letters patent. The plaintiffs also claimed damages and the usual ancillary relief in a patent action.

The Evenlite Co. was sued for selling, supplying and making the alleged infringing lamps called Evenlite tubular electric lamps and J. Lyons & Co., the well-known caterers, were sued for the use in this country of lamps manufactured, it was alleged, in accordance with the invention described in Mr. Mayer's patent.

The defendants denied the allegation of infringement and pleaded that Mr. Mayer's invention was not novel by reason of prior publication, user, prior general common knowledge and by the public manufacture and sale by Violite, Ltd., of lamps under the reference type of "Barlux." The defendants further pleaded that the monopoly claimed by the plaintiffs involved no invention step and counterclaimed for revocation of the patent.

The earlier proceedings were reported in last week's issue of the ELECTRICAL REVIEW.

On March 7th after the evidence for the defendants and addresses of counsel for the respective parties had been concluded, his Lordship, in delivering judgment dismissing the action, said the invention claimed was concerned with long lamps used for strip lighting. The difficulty had been that the support of the filament cast a shadow upon the wall of the tube. By his specification Mr. Mayer claimed that this difficulty was obviated, a long support being bent from side to side in zig-zag or wave form which did not touch the walls of the tube. Upon the interpretation which he put on the English specification of Mr. Mayer and his application for his German patent it was plain that the invention embodied in the former was not that for which Mr. Mayer applied for protection in Germany. He (the Judge) held that the patent was void under the provision of Section 25 of the Patents and Designs Act, 1932.

Upon the issue of infringement he held that the patent was invalid because it had been anticipated by the "Barlux" lamp and also because the words in the specification were ambiguous.

The result was that the action failed and must be dismissed with costs, and the defendants' counterclaim for revocation of the letters patent succeeded and the plaintiffs must pay the costs of the counterclaim.

Winding-up Petitions

In the Companies' Court on March 11th Mr. Justice Crossman again had before him the petition for the compulsory winding-up of the Asbestos, Molybdenum & Tungsten Co., Ltd., which had been ordered to stand over a number of times. Mr. Gordon Brown, who appeared in support of the petition, said it was a shareholders' petition which had stood over several times for further evidence. Negotiations were going on for a settlement, but the parties had failed to arrive at one, and he (counsel) now asked his Lordship to fix a day for the hearing of the petition.

His Lordship suggested that counsel should apply to Mr. Justice Simonds who would be taking the company work next term. This course was agreed to, and his Lordship accordingly stood the petition over until the first petition day next term.

Mr. Justice Crossman also had before him in the list for hearing a petition for the winding-up of the Electric Movement & Engineering Co., Ltd., but the petition was ordered to stand over until March 18th.

Parliamentary News

Wessex Electricity Finance

THE Wessex Electricity Bill was considered on March 6th by the House of Commons Committee on Unopposed Bills. Col. D. Clinton Brown (Hexham, N.) presided.

Mr. C. E. C. Browne (Dyson & Co.), Parliamentary agent, said it was sought to remove restrictions put in the Company's Act of 1937 on the application of revenue to the redemption of preference or debenture stock and to authorise the Company to form a sinking fund out of revenue. It was not realised in 1937 that by clauses inserted in the Act of that year the Company was giving up something of great value to the consumers as well as to the shareholders when it relinquished the right to redeem capital out of revenue. It was realised, however, last July when the Company wanted to make an issue of redeemable debentures. It had had the whole of the terms of the issue settled with the finance house concerned and approved by the Electricity Commissioners before the restriction was discovered. Then negotiations had to begin again. The result was that the period of redemption was reduced from a maximum of 30 years and a minimum of 10 years to 20 years and 15 years, and there would probably be a difference against the Company of 1½ per cent. in the issue price.

The chairman asked whether it was possible that the Company might prejudice the consumer by putting into the sinking fund large sums of money instead of reducing the price of electricity. Mr. Herbert, solicitor to the Company, said there was a provision in the Bill that the Company should not fix the sinking fund so as to redeem in less than 10 years.

The preamble of the Bill was found proved and it was ordered to be reported for third reading.

London Electricity Charges

On March 5th Mr. W. Green asked the Minister of Transport whether he had taken any steps to satisfy himself that the recent increase of 50 per cent. in the charges to domestic consumers of electricity by the London Electric Supply Corporation, Ltd., was justified and, further, that such increase was not in the nature of profiteering.

Captain Wallace said that the increase in the electricity charges of the Company had not previously been brought to his notice. He had asked the Electricity Commissioners to obtain particulars from the Company, and he would communicate further with the hon. member as soon as possible.

PERSONAL AND SOCIAL

Information regarding new appointments and other matters of interest for this page are welcomed

THE Midland Centre of the Illuminating Engineering Society held its annual dinner on March 1st in Birmingham, 120 members and guests being present. **Mr. F. S. Ette,** chairman of the Centre, welcomed the guests and outlined the suggested programme for the remainder of the season. Mr. F. C. Smith, president of the Society, responded on behalf of the visitors and gave an outline of the activities of the Society since the commencement of hostilities. Following the dinner, which was of an informal character, a first-class entertainment was provided, and in addition to the professional element a number of items were provided by members, one of whom, Mr. A. E. B. Wallis, hon. sec. of the Centre, again demonstrated what could be done in the way of "light" music with the help of electric lamps. Thanks were given for the admirable arrangements which were carried out by Mr. Wallis, and Mr. C. J. Allderidge, assistant hon. secretary.

Lord Hirst, chairman of the General Electric Co., Ltd., has had a bad attack of influenza, but we are glad to hear as we go to press that his condition has improved.

Wimbledon Corporation Electricity Committee recommends a grant of 100 guineas to **Mr. W. J. Oswald,** chief assistant electrical engineer, for his services in the negotiations for the extension of the bulk supply agreement with the Joint Electricity Authority.

Mr. A. P. H. Pehrson has been appointed by Simmonds Aerocessories, Ltd., as their special manufacturers' representative in the Midlands.

Mr. B. A. Prescott, chief clerk and cashier at the Banbury office of the S.W.S. Power Company, was, on Friday last, presented with a gold wristlet watch by the Banbury employees on the occasion of his leaving the company after fifteen years' service to join the Yorkshire Electric Power Co. The presentation was made by the district representative, Mr. J. H. Davies.

Mr. A. W. Hedley, branch office manager at Bristol for Standard Telephones and Cables, Ltd., has been promoted to a position on the head office administration staff. He is succeeded by **Mr. W. Litherland,** who is well known in the radio trade as sales promotion manager of Kolster-Brandes, Ltd.

Mr. C. P. Beardsall has been appointed to special duties by Ferranti, Ltd., for the duration of the war, and **Mr. H. Orton** has taken over as acting radio sales manager. Mr. Orton formerly represented Ferranti, Ltd., in the Midlands area, and will now make his headquarters in London.

Mr. T. P. Easton, tramways manager at Newcastle-on-Tyne, who was due to retire at the end of this month has agreed to continue for a further year.

The dramatic section of Dagenham Cables Sports Club (Union Cable Co., Ltd., and Southern United Telephone Cables, Ltd.), recently presented "Meet the Family" in the canteen at the factory. A large audience, which included the club president, **Mr. J. Snow Huddleston,** thoroughly enjoyed this sparkling comedy in which the cast did full justice to the many humorous parts. At the conclusion of the show Mrs. Huddleston, on behalf of the cast, presented a bouquet of tulips to the producer, Miss Hilda M. Cowley, and Mr. Huddleston expressed his hearty congratulations to all concerned. On Saturday the show was repeated at Enfield Cable Works, under an arrangement for interchange of plays between the dramatic sections of the two clubs.

Mr. Victor Bingham informs us that he has resigned his position as publicity manager to Worthington-Simpson, Ltd., Newark-on-Trent.

Professor W. M. Thornton, Emeritus Professor of Electrical Engineering at King's College, Newcastle, has accepted an invitation from the North-East Coast Institution of Engineers and Shipbuilders to deliver the 1940 Andrew Laing lecture. His subject will be "The Fundamentals of Power Transmission with Reference to the Electrical Theory of Matter."

Mr. S. H. Taylor has been appointed a director of the Madras Electric Supply Corporation to fill the vacancy caused by the death of Mr. H. Burkinshaw.

Morecambe Electricity Committee has appointed **Mr. W. Brown** (mains superintendent) as acting electrical engineer. The position of borough electrical engineer recently vacated by Mr. Percy Clegg, who has taken up a similar position at Macclesfield, is to be re-advertised.

Mr. W. F. Hindes has been presented with a gold-mounted umbrella and shooting-stick by his former colleagues, following his recent retirement from the position of wayleaves officer of the Colchester Corporation Electricity Supply Department. The presentation was made by Mr. G. P. Dixon, the borough electrical engineer.

Mr. Angus F. Pine, a member of the staff of the Butterley Company's electrical department, has been appointed lecturer and electrical engineer at the Nuneaton Technical College under the Warwickshire County Council. For the past three years he has been serving as part-time lecturer at the Heanor Mining and Technical College. Mr. Pine is a graduate of the I.E.E. and a member of the Council of the Midland Branch of the A.M.E.E.

Sir Felix Pole, chairman of Associated Electrical Industries, Ltd., last Friday made presentations to six men who had each served fifty years with the Edison Swan Electric Co., Ltd. This makes thirteen such presentations made to

Sir Felix Pole making presentations to six Ediswan veterans

"Ediswan" employees, all of whom are still alive, and the majority still working. The men honoured this time were Messrs. S. Pritchard, A. W. Hack, D. Lishman, B. Rawlings, A. E. Duke and T. Orme.

Obituary

C. F. Spencer.—We regret to announce the death, on March 7th, of Mr. Charles Frederick Spencer, for seventeen years chairman of the Edison Swan Electric Co., Ltd., as well as chairman of eight other companies and a director of four more. He died suddenly after a very short illness, and was buried at Putney Vale Cemetery on Tuesday. Floral tributes were sent by the board of directors, the branch managers and staffs of the Edison Swan Electric Co., Ltd., and Edison Swan Cables, Ltd., Mr. P. Kelly, Mr. F. V. Hasemore and Mr. J. H. W. Morgan. The funeral was attended by Messrs. P. Kelly, F. V. Hasemore, E. A. Gimingham, C. H. Cox and R. J. Morris.

Mr. S. W. Corns.—The death occurred on February 22nd of Mr. Samuel William Corns, assistant electrical engineer (generation), Neasden Section, London Passenger Transport Board. The cremation took place at Golders Green on February 26th. Mr. Corns, who was sixty-one, received his technical training at Wolverhampton Technical School and Finsbury Institute under Professor W. E. Dalby. He was apprenticed to Davis Bros. & Co., Wolverhampton, and later saw service with the E.C.C. and the B.T.H. Co. He joined the staff of the Metropolitan Railway in 1904 and was transferred in 1933 to the London Passenger Transport Board. He was a member of the I.E.E., and of the Institute of Transport, and an associate member of the Institution of Mechanical Engineers. He leaves a widow, two sons and a daughter. The sons have recently been gazetted.

Mr. D. A. S. Porteous.—We regret to record the death on March 9th, at the age of fifty-six, of Mr. Dundas Alexander Smith Porteous, A.C.G.I., A.M.I.E.E., sales engineer to the Enfield Cable Works, Ltd. He was born in Paisley and was educated at Bancrofts School, Woodford, and at the City & Guilds Engineering College. Joining Johnson & Phillips, Ltd., in 1904 he later went to Pirelli & Cia., Milan, and then became manager of the Compania Cables Electricos S.A., Barcelona, rejoining Johnson & Phillips, Ltd., during the last war. In 1928 he was engaged by the Enfield Cable Works, Ltd., as works manager, being appointed sales engineer later. Mr. Porteous was a member of the Associazione Elettrotecnica Italiana, a member of the Association of Mining Electrical Engineers, and honorary technical advisor to the I.R.I. He was very well known in the rubber cable industry.

Hon. I. B. Lucas.—The death is reported last Friday from Toronto of the Hon. Isaac Benson Lucas, from 1914 to 1934 a member of the Hydro-Electric Power Commission of Ontario. During the latter part of the time he served as the Commission's general solicitor and counsel.

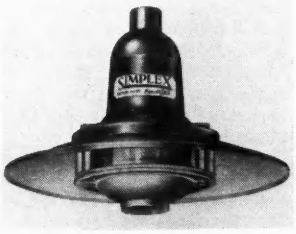
Will.—Sir Bernard E. Greenwell, chairman of the County of London Electric Supply Co., Ltd.—Further grant of probate in respect of settled property valued at £581,430 has been issued in the estate, making, with unsettled property already valued at £667,793, a total of £1,249,224.

NEW ELECTRICAL PRODUCTS

A Review of Equipment Recently Marketed

Street Lighting Fitting

IN view of the fine limits imposed by BS/ARP/37 it is essential that street lighting fittings shall not only give the maximum allowed candle-power at every angle permitted by the regulations, but also maintain these already low values without rapid diminution due to insects and dust soiling or clogging the interior.



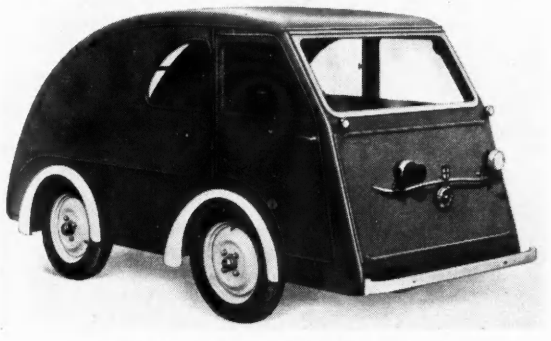
Simplex "Starlight" fitting

In the "Starlite" fitting made by the SIMPLEX ELECTRIC CO., LTD., Simplex Works, Oldbury, Birmingham, the whole of the optical assembly, sealed in a dust and insect proof clear glass cylinder, can be detached for re-lamping and re-assembled in a few seconds, without any possibility of error. Moreover, the candle-power and shape of the polar curve are controlled by selective absorptions of unbreakable, opaque metal parts, and are not dependent on the reflection or transmission of white reflectors or opal glass, which are liable to variations.

The use of a 15-W lamp for all the specified mounting heights is made possible by the optical control unit which operates independently over each zone angle. Consequently, the candle-power can be limited to any specified value at a given angle without excessive candle-power at adjacent angles. The total absorption is claimed to be much lower than in other systems, enabling the smallest available lamps to be used for the whole range. No adjustments are needed to allow for the normal tolerances in the light centre length of lamps, while the shape of the fitting, in conjunction with accessories available, enables existing lanterns to be easily converted, without rewiring.

Electric Runabout

Petrol rationing directs particular attention to a battery operated runabout which PARTRIDGE, WILSON & CO., LTD., Davenset Works, Evingdon Road, Leicester, have just introduced. Fitted with a shooting brake or "estate" type body the vehicle, which is designed for a load of 6 cwt., will take a considerable amount of luggage, &c., in addition to two or three passengers. A special short-base commercial chassis is employed, and the interior is built to private motor-car standards.



Partridge, Wilson electric runabout

The 4-HP continuously rated motor incorporated is designed to give a maximum speed of 25 MPH with 15-20 MPH uphill. A range of 40 miles per charge is obtained with its 30-cell, 191-Ah "Exide Ironclad" battery.

Electrical Equipment Components

The V.G. MANUFACTURING CO., LTD., Gorst Road, Park Royal, London, N.W.10, which makes "Scruit" connectors, has extended its production to include several other products. The "Vee-Gee" porcelain interlocking beads are made in five sizes suitable for insulating wire from Nos. 19 to 10 SWG. These cup-shaped beads are made from high-grade porcelain, giving the highest degree of insulation yet allowing complete flexibility for intricate loops and bends. They are impervious to heat or moisture and are particularly suitable for electric fires, &c., and for the flexible connections used on mercury switches. Six sizes of contact rings cover a wide variety of uses, including air conditioning, refrigeration and water purification. The company also specialises in an absorbent ring and pellet made from special ceramic material. The "Vee-Gee" sticky thread has among its uses the binding of flexible wire braiding.

Lighting Fittings

A number of new designs in domestic and other types of fittings have just been added to the extensive range offered by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2. These have been made to comply with the decorative requirements of the modern home, and are at the same time highly efficient as lighting agents. One of the most pleasing units is a pendant which has a silver cellulose finish, and is fitted with two "Vitroflex" pink mirror bands, the glassware also being pink. A crystal ball at the bottom presents a novel effect. A companion unit to this fitting has three candle-lamps with pink parchment shades. Another pendant with a champagne or pink bowl 1 ft. 5½ in. in diameter, suspended on a glass shade, has an aperture in the base permitting direct illumination below.

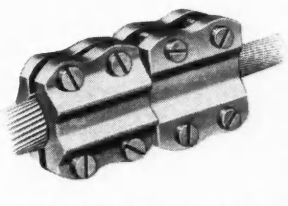
G.E.C. study lamp

Among ceiling units a smart "Superlux" glass bowl has sprayed cream metalwork with a chromium plated ornamental knob in the centre and accommodates two 60-W lamps. In the cheaper class market is a white "Superlux" bowl 12 in. in diameter with sprayed silver metalwork. A more imposing fitting of the same type has a champagne flashed opal bowl. Its chromium plated metalwork is neatly designed with four decorative clasps around the edge and an engraved stud set in the bowl. A wall bracket, with excellent lighting qualities, is a sprayed cream metal fitting with a decorative pink band of glass around the centre and a peach mirror back.

The study lamp illustrated has a decorative metal shade divided by an illuminated glass band. The plinth is finished in satin silver or chromium plate, and the shade in light green or cream. A smaller chromium plated lamp of the same type has a smart streamline appearance.

Universal Clamp

A universal clamp connector, made by W. T. HENLEY'S TELEGRAPH WORKS CO., LTD., Milton Court, Westcott, Dorking, has a wide variety of uses and can accommodate a wide range of conductor sizes. This latter advantage, of course, appreciably reduces the number of sizes of connectors to be kept in stock. Four sizes of connectors will cover the whole conductor range from 0.0225 sq. in. to 0.50 sq. in., which are about the minimum and maximum limits the average jointer has to handle.



Universal clamp connector

High grade tinned brass is employed in the construction of the connectors, each of which is clamped by a separate reversible cap so designed that in conjunction with the base portion one face will clamp large size conductors, while by reversing the cap the other face will clamp smaller size conductors. The cap is tightened by rust-proofed steel screws.

The connectors will be found particularly useful in situations where sweated joints are not permissible or advisable, and for emergency jointing.

CORRESPONDENCE

Every letter must be accompanied by the writer's name and address preferably, but not necessarily, for publication. The Editors cannot accept responsibility for correspondents' opinions

Chief Engineers' Salaries

I ACCEPT, with thanks, Mr. Banks's correction that the National Joint Board has not considered chief engineers' salaries, but am compelled to refute his sweeping generalisation as to the inaccuracy of my letter. The historical preamble which I gave is not inaccurate. It is a fair extract from a printed letter dated January 11th, 1921, entitled "Copy of Letter and Schedule drawn up by Alderman Walker for circulation to Electricity Committees who are members of the I.M.E.A." The salary scale is from the same document.

I then said that a Joint Committee to discuss chief engineers' salaries had been formed. This is entirely correct, as repeated recent references to this Committee in your columns will prove. My letter then stated that this committee had agreed a scale of salaries. I must adhere to my statement that a new scale has been formulated and submitted to those municipalities (not D.J.B.'s) who are members of this Committee.

My object in bringing forward this criticism against the A.M.E.E. was not to cavil, but seriously to try and ensure that the Association shall act in the best interests of all engineers and not, as many engineers think, in the interests of a minority. Has the Association considered, for instance, what would happen if all *engineers* did abstain from applying for "blacklisted" appointments? Have they no knowledge of the growing number of undertakings which have successfully appointed a non-engineer as manager, with a junior engineering staff to carry out engineering duties?

Do they appreciate the growing impatience with the serious anomalies, a few of which are shown in the following list of recent appointments:—

	Salary offered	Minimum under Walker Scale	Action
Leeds	£1,600	£2,705	Not banned
Norwich	£1,500–£1,700	£2,165	Banned
Worcester	£1,100–£1,200	£1,505	Not banned

The Association cannot ignore indefinitely the official protests which have already been made against its actions, representing 40 per cent. of the E.P.E.A. membership, and I suggest that it should immediately take such steps as will produce a frank democratic organisation. I hope that my protest will eventually prove of value.

March 6th. CONSTITUTIONAL.

Neon Sign Contracts

The article by Mr. E. P. Hollis, B.Sc., on page 274 of your last issue strikes me, and those of my colleagues whom I have consulted, as being a most curious document. With all respect to Mr. Hollis his knowledge of the subject appears more theoretical and legal than practical or commercial. Furthermore, Mr. Hollis's technique seems to be first, to raise a hare and then to kill it himself. This practice is in itself confusing, but to make matters worse, Mr. Hollis's killings are performed privately, and I doubt whether a layman, reading this article, would be really aware that such executions had taken place. Amongst the specific points to which I think attention should be drawn are the following:

(1) Speaking for my own company, our contracts with our customers are almost invariably "hire-maintenance" not "hire-purchase." Further, as regards our own form of agreement, we have taken very high legal advice and are advised that our contract is perfectly valid, even under present conditions. This probably holds good for most forms of contracts used in the trade and it seems a pity that Mr. Hollis should cast the shadow of doubt on the legal position which, in my opinion, his article does cast.

(2) From the moral point of view, which is perhaps even more important than the legal point of view, what support is possible for the suggestion that any loss arising out of the present situation "should be shared equally by manufacturer and user?" The neon sign user was always given the option of either purchasing his display outright or of hiring it in some manner. There was no difference in intention, whichever method was chosen, and the only distinction was of a purely financial nature. If a user had purchased a given sign prior to September 3rd last, he clearly would not now ask the manufacturer to refund the purchase price. Why, therefore, should he expect to be released from a clear agreement to pay hire for the same sign over a period, particularly bearing in mind that the sign was specially made and erected for him? There are many cases of goods purchased (or contracts made) before the war where the articles concerned have lost a good part of their utility owing to war conditions—motor cars and Central London shop leases are typical instances—but surely no one would suggest that such bargains should be declared null and void.

(3) Mr. Hollis seems to create an unpleasant atmosphere in connection with the whole hire method, on which the neon sign industry has been so largely established, not only in this country but abroad. This I strongly deplore and note that Mr. Hollis does not advance any reasons for his attack except his own lack of understanding of users' acceptance of the method of trading in question. There clearly seems much in this matter which Mr. Hollis fails to understand. The point is too wide a one thoroughly to investigate in this letter, but the following should perhaps be a complete answer in itself: My own Company have been the pioneers of this method of trading in the United Kingdom since we were established in 1930, and our business has been successfully built upon repeat orders on "hire-maintenance" terms from *inter alia*, many of the very largest companies in the country, including banks, insurance companies, breweries, multiple stores, cinema circuits and the like. Our hire-maintenance contract has operated between such customers and ourselves over a considerable period of years, to the entire satisfaction of both sides. It is surely fair to conclude, therefore, that this method of trading has definite advantages and is not the imposition on the user that Mr. Hollis's article seems to imply.

My Company's customers could undoubtedly effect the income-tax saving mentioned by Mr. Hollis, and the Inland Revenue Authorities have been perfectly aware of this for many years—there was nothing *sub-rosa* about the situation. Further, our hire-maintenance agreement has remained substantially unaltered since 1930, and is certainly not, therefore, designed to evade the comparatively recent legislation which concerns hire-purchase transactions.

London, W.C.1, *March 11th.* S. D. MOYS,

Chairman, The Master Sign Makers' Association (Electrical Section).

Director and General Manager. Claude-General Neon Lights, Ltd.

Transformer Fire Risks

Regarding the article on the above subject in your issue of March 8th, Mr. E. T. Norris's conclusions can almost be considered as *ex cathedra*, but I cannot help feeling that they are a little pessimistic.

It does not seem to me that there is any need or use for a "fire-proof" transformer, in the sense that the whole of the materials used in its construction should withstand *any* unlimited temperature, *i.e.*, such as the melting points of copper or steel. There is, however, a clamant need for a transformer which cannot itself initiate a fire under any service or fault conditions.

A complete examination of existing materials resulted in the ruling out of glass, at present, in any form for winding insulation, partly for reasons adduced by Mr. Norris, and partly for other and even more important reasons. Chlorinated diphenyls present certain serious difficulties in addition to their cost and their effects on both conductors and insulation. A warning in connection with their handling and use is necessary.

A long series of tests has resulted in the development of a process by which asbestos and other materials can be so treated as to remove their objectionable hygroscopic characteristics and certain new and, perhaps, somewhat unorthodox materials have been developed or adopted. As a result, it has been possible to produce transformers up to 500 kVA and 11 kV which are claimed to be "fire-resisting." In no circumstances can they initiate a fire, even should a conductor become incandescent under short-circuit conditions. They are air cooled, no oil, liquid, or compound being used in their construction. Up to the present no attempt has been made to utilise their heat-resisting qualities to increase their rating, which is in accordance with B.S.S. 171, but several units have been run at temperatures up to 200 deg. C for long periods without symptoms of distress. Other units have carried up to three times their B.S.S. rated load for half an hour, and one 100-kVA 11-kV (delta) three-phase unit is reported as having been in service out of doors for six months, with an average load of 160 kVA. I am confident that within two or three years much larger units of this type will be in service for operation on higher voltages. Such

(*Concluded at foot of next page.*)

COMMERCIAL and INDUSTRIAL NEWS

Skilled Labour Problem. Lighting Fittings Association's Report. Fluorescent Lighting Applications. Domestic Refrigeration Association. Factory Lighting in Scotland

Home-produced Non-ferrous Metals

THE Minister of Supply has appointed a Departmental Committee "to consider whether an increased production of non-ferrous metallic ores in the United Kingdom is desirable and practicable, and to make recommendations." The members of the Committee are: Sir William Larke, K.B.E. (chairman); Dr. C. G. Cullis, M.Inst.M.M., Mr. Arthur Deakin, Mr. J. Stanley Holmes, M.P., and Mr. S. S. Taylor, C.M.G., D.S.O. Professor J. A. S. Ritson, D.S.O., M.Inst.M.M., Mr. T. Eastwood and Dr. M. Macgregor will act as assessors to the Committee. The Secretary is Mr. W. C. C. Rose, of the Geological Survey of Great Britain, Exhibition Road, South Kensington, S.W.7.

Floor Maintenance

By their recent acquisition of the business of R. G. Dixon and Co., Ltd., manufacturers of carpet shampooing and suction squeegee machines, Rollnick & Gordon, Ltd., have added to their facilities for floor maintenance. At their showrooms at 419, Oxford Street, W.1, they have now inaugurated a scheme known as the "Columbus Floor Service." Over fifty representative types of floors enable all who are interested to test the company's appliances. The "Columbus" equipment serves not only as a suction polisher, vacuum cleaner and floor scrubber, but also, with the aid of a special attachment, as a lawn mower; when used for polishing, the "Tower" polish sprayer is a useful accessory. The "Dixon" carpet shampooing machine enables carpets to be cleaned *in situ*. The suction "squeegee" offers an effective method of collecting water from large areas of floor after scrubbing.

Skilled Labour Problem

A national conference on the means of maintaining the supply of skilled labour will be held at the Park Lane Hotel, Piccadilly, on March 18th. The Works Management Association, which has convened the conference, has been conducting a private inquiry among its members on how they are coping with the present difficulty, and the gathering at the Park Lane Hotel will seek to focus all this research and will give works managers an opportunity of comparing notes and of meeting those who under the Board of Education are developing schemes for an intensified training of men and women to operate plant in our greatly expanded engineering and technical industries. The speakers will include Sir Patrick Hannon, M.P., and Mr. G. Chelioti, general manager of the Osram G.E.C. Lamp Works.

A Radio Guide

Many changes in broadcasting have taken place since the outbreak of war and owners of receiving sets, particularly the large number who desire to hear foreign stations, are no doubt experiencing some difficulty with regard to the present wavelengths. This applies especially to the short-wave band. For the benefit of listeners an "All-Wave Broadcasting Station Guide" will be published with the April issue of *The Wireless World*, on sale March 18th (price 1s.) in the form of a stout card printed in colour and containing in convenient form the long and medium wavelengths of all European stations and the short wavelengths of the world. This will make it possible easily to locate and tune in to any desired station.

B.T.H. Employees' National Savings

Employees of the British Thomson-Houston Co., Ltd., are making a valuable contribution to the war finance campaign by means of a savings plan inaugurated by the company which enables all employees to purchase national savings certificates by weekly or monthly contributions deducted from their remuneration. The company purchased a considerable number of certificates to form the nucleus of the plan, and this gives contributors the advantage of receiving predated certificates. All B.T.H. employees, of whom there are over 18,000, have

Demonstrating "Columbus" and "Dixon" appliances on different types of floor surfaces

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Correspondence (*Concluded from previous page*)

transformers, particularly for 11 kV, are somewhat more expensive than oil-coiled units, but not more so than the traditional air-cooled transformer.

Mr. Norris regards it as unlikely that large generator and grid transformers of the fire-resisting type will be produced. For voltages above 33 kV I am inclined to agree with him, but I would suggest that the problems of heat dissipation and insulation are somewhat akin as regards transformers and generators, whatever their size.

So far, we have seen no suggestion that alternators, of even the largest sizes, should be immersed in oil, and, providing the insulating materials are satisfactory, there should be no greater difficulty in insulating a transformer than a generator. As regards cooling, air blast can be used in connection with large transformers without in any way interfering with their fire-resisting qualities.

TRANSFORMERS AND WELDERS, LTD.
T. F. Altham,
Watford, *March 8th.* *Managing Director.*

Temporary Joints

The advantage of the somewhat elaborate joint described on page 124 of your issue of February 2nd would appear to reside in the ability to overcome a shortage of two conductor joints by using fourteen Bartby clips and four stay thimbles instead. There would not be much saving in time and in either case it would be necessary to insert a length of conductor. I am doubtful whether the alternative materials would be more readily available and, under the emergency conditions mentioned, surely an adequate stock of proper conductor joints would be held. Although the fitting of proper joints might take slightly longer, there would be no necessity to return and make a permanent joint.

Should, however, shortages of joints occur and Bartby clips be available, the rather more obvious temporary repair of bringing the two ends of the broken conductor together, laying a 2 ft. length of conductor alongside them and securing this by four clips (two on either side of the break) has been found very effective. It is preferable not to use an aluminium tape so that the clips can bite into the strands and grip them securely, the damaged parts being, of course, cut out when the final repair is made. While the factor of safety may be slightly reduced under ice and wind conditions by this method, this should not be of much consequence in such an emergency. In the unlikely event of a large amount of conductor being burnt away, this can be allowed for by increasing the length of "strap" conductor.

This method avoids the use of thimbles and the bending round these of a piece of make-up conductor; time is saved on account of the reduced operations; fewer clips are used and a minimum length of original conductor is damaged; there is no need for a separate jumper to ensure adequate conductivity, but should there be any uneasiness on this latter point, a parallel grooved clamp can be inserted at either end of the temporary joint as suggested by Mr. C. H. F. Ridpath in your issue of February 16th.

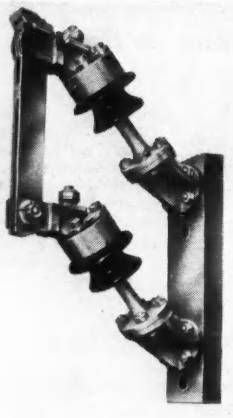
Experience has shown the method to be quite satisfactory as a repair measure for both stranded copper and segmental steel-cored aluminium conductors of all normal sizes commonly in use and subsequent inspections have on no occasion disclosed any sign of slip. P. K. DAVIS.

Barnet, *March 5th.*

been circularised by letter and the plan has met with an encouraging response.

Isolating Switches

British Insulated Cables, Ltd., has just completed an order for a number of single-pole, 6.6-kV, 800-A, outdoor isolating switches required by an overseas customer. The units are generally similar in design to the company's standard 200-A isolating switches, but owing to their large current-carrying capacity they are fitted with double blades and double contacts. Clearances conform to B.S.162-1938.



B.I. 6.6-kV, 800-A switch

Platinum Metals in 1939

World production of platinum metals in 1939 was roughly 500,000 ounces, with consumption approximately equal to this amount. The principal market for platinum metals continued to be the United States, whose imports for the year are estimated to have exceeded 250,000 ounces. The countries from which the United States imported the major portion of the platinum metals were Great Britain, Russia and Colombo.

The development of industrial uses for the platinum metals was one of the important activities of the year. They are being increasingly used in the chemical industry, in the air service, for lighting reflectors, the rayon and other industries

Lighting Fittings Association

The report for 1939 of the Electric Light Fittings Association mentions that nine further manufacturers have joined up and the Association claims to represent practically 100 per cent. of the total output of electric lighting fittings in this country. Special reference is made to the Fair Trading Policy: the Industrial and Commercial Section has put into operation an approved trading code which elaborates procedure with regard to quantity buying and conditions of sale generally. It is hoped that negotiations proceeding with the Electrical Wholesalers' Federation will lead to the Code's becoming the trading practice throughout the country. A similar code has been voluntarily adopted by the Ornamental and Decorative Fittings Section.

All sections have consented to restrict the granting of wholesale status terms to the approved firms in the appropriate E.L.F.A. register. It is emphasised that every possible step is being taken to keep price increases down to the minimum. With regard to restricted street lighting the Association has taken all possible steps to safeguard the general interests of the fittings manufacturing industry.

Mr. A. E. Iliffe (Benjamin Electric, Ltd.) has again been unanimously elected chairman for the current year. The Council remains the same but with Mr. W. C. Huston (B.T.H. Co.) as additional representative for the Industrial and Commercial Section.

Fluorescent Lighting Applications

Since the war started fluorescent lighting, hitherto mainly of interest in the theatre, has received a great deal of attention both for decorative and utilitarian applications. On Tuesday at the showrooms of Harcourt, Ltd., Crown House, Aldwych, members of the Electrical Association for Women had the opportunity of learning from a demonstration given by Mr. J. B. Harris, one of the company's illuminating engineers, something of the principles involved, the methods employed and the numerous applications. After explaining what fluorescence was, Mr. Harris showed some of the materials available for producing fluorescent lighting effects, namely powders, water colours, transparent liquid colourings, chalk, cellulose acetate sheets, plastics, and general purpose paint.

The three ultra-violet-ray sources now used were demonstrated—the mercury vapour discharge lamp with special inner bulb, the tungsten filament lamp and filter glass, and argon lamps for small displays. The visitors then had an opportunity of comparing the fluorescent discharge lamp with the ordinary mercury discharge lamp and seeing its colour correction effect. They were also shown the new 5 ft. 80-W low-voltage fluorescent tube and had its advantages pointed out to them. In conclusion, Mr. Harris indicated the numerous applications to which fluorescent lighting could be put, for theatre stage lighting; trick effects; general display purposes; in the home for alcoves, recesses, ceilings, bowls of treated flowers; for A.R.P. lighting in light locks, theatre and cinema foyers, power and fire stations; and for commercial uses in laundries (for marking and showing up stains), philately (for detecting forgeries), food examination, criminology and precious stone analysis.

Factory Lighting in Scotland

In connection with the E.D.A.-E.L.M.A. Factory Lighting Campaign a meeting was held under the auspices of the Paisley Electrical Society at the end of February, and invitations were also issued to factory executives and works electricians in the area. A very good gathering resulted and this success was repeated by a similar meeting in Motherwell on March 4th. At each of the meetings Mr. E. M. Hood, E.D.A., Area Officer, indicated the purpose of the campaign, and a lecture was given by Mr. M. W. Hime, A.M.I.E.E., district engineer of the E.L.M.A. Lighting Service Bureau of Scotland, on "Modern Factory Lighting," emphasising that under present conditions lighting in factories was of even greater importance than in peace time. A.R.P. requirements were also dealt with, and the lecture was illustrated by lantern slides and demonstrations. Local factory officials responded well to the invitation, and the discussions at the close of the lectures elicited a number of questions relating to lighting problems.

Domestic Refrigeration Association

The following makers of domestic refrigerators have formed a Domestic Electric Refrigeration Association ("D.E.R.A."):—Frigidaire, Ltd.; the General Electric Co., Ltd. (Coldair, Ltd.); H.M.V. Household Appliances; International Refrigerator Co., Ltd. (International General Electric Company of New York, Ltd.); Kelvinator, Ltd.; Marco Refrigerators, Ltd.; and the Pressed Steel Co., Ltd. The first chairman is Mr. F. Winstanley (General Electric Co., Ltd.), with Mr. E. G. Batt as vice-chairman. Mr. Felix A. Rogers, 36, Kingsway, W.C.2, is the secretary. The principal aims and objects of the D.E.R.A. are to promote, foster, develop and protect the business of domestic electric refrigeration in this country, and to establish and maintain fair and reasonable conditions in the distribution and sale of refrigerators.

E.T.U. Opposes Labour Dilution

At a meeting of London members of the Electrical Trades Union on March 3rd a resolution was passed opposing any form of dilution of labour in its industry and asking the Ministry of Labour for the complete exemption of all members of the union from service in the armed forces and for the recall of members now serving. The resolution states that there is a surplus of skilled labour in London available for work in the provinces, provided that employers are prepared to pay the appropriate rates of wages and a subsistence allowance of £2 a week, and that the age in the schedule of reserved occupations for electricians is reduced in order to conserve a sufficiency of skilled labour for the industry.

Trade Announcements

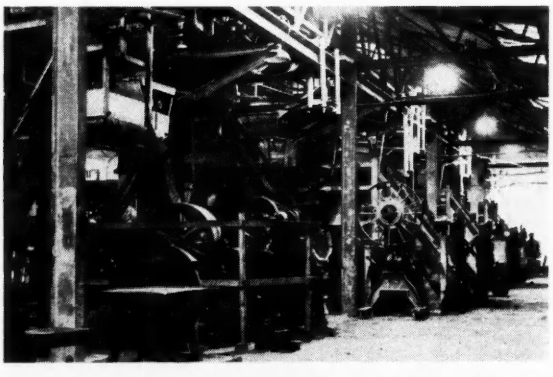
Heala (Electro-Medical), Ltd., are moving from Beckenham and opening new offices and ground floor showrooms at 33, New Cavendish Street, London, W.1.

The name of Grahams Radio, Ltd., of 14, Exmouth Market, London, E.C.1, has been changed to Grahams Electrical, Ltd.

G. A. Harvey & Co. (London), Ltd., have now re-opened their West-end offices at 58, Victoria Street, S.W.1 (telephone: Victoria 4963).

Brickmaking Plant Lighting Installation

The Cannock Chase Colliery Co. has recently erected one of the most up-to-date brickmaking plants in the country and for the lighting arrangements Metrovick illuminating engineers were called into consultation. Up to the present six automatic brick presses have been installed. These are fed by gantry conveyors from the hoppers and mixers and, as the accompanying illustration shows, this entails a considerable amount of superstructure. This superstructure offered a problem to the lighting engineers but by a staggered arrangement of 250-W Metrovick mercury electric-discharge lamp units efficient lighting is provided throughout the press room



Metrovick mercury electric-discharge lighting at the brickmaking works of the Cannock Chase Colliery Co.

both for normal working and on occasions when the machinery and gantries require overhauling. Similar discharge lamp units have been used in the drying room with "Cosmos" metal filament lamps wherever pilot or local lighting is necessary. Outside, kilns and roadways are floodlighted with Metrovick "FS 24" mercury units, but this is of course temporarily reduced to pilot lighting during the war. In addition to lighting the brickmaking plant Metrovick engineers were responsible for new mercury electric-discharge lighting at the colliery screens and picking belts.

Trading With the Enemy

The Board of Trade has issued the Trading with the Enemy (Specified Persons) (Amendment) (No. 3) Order which gives a further list of firms and individuals with which trading relations are forbidden. The list includes the following:—A.E.G. China Electric Co., Shanghai and all branches in China; the Demag A.G. (Duisburg), Shanghai; M.A N. Works, China Branch, Shanghai; the Mannesmann-röhren-Werke A.G. Komotau (China Branch), Shanghai; the Siemens China Co., Shanghai, and all branches in China; the Telefunken East Asiatic Wireless Telegraph Co., Shanghai; and the General Electro Industry Co., Ltd., Athens.

Dutch Electrical Imports and Exports

The following tables show Holland's imports and exports of electrical machinery and allied material during 1939 as compared with the preceding year. It will be seen that both the imports and exports show a marked decrease. During the period the sterling value of the guilder fluctuated between 8.70 and 7.54 to the £.

	Imports		Exports	
	1938 Value in 1,000 guilders	1939 Value in 1,000 guilders	1938 Value in 1,000 guilders	1939 Value in 1,000 guilders
Generators and parts	1,556	1,806	732	389
Motors and parts	3,603	3,048	1,669	1,299
Radio sets and parts	8,036	7,185	44,837	43,099
Telegraph and telephone material	6,596	7,794	361	494
Vacuum cleaners and parts	1,013	1,224	461	1,026
Measuring instruments and other apparatus	11,105	11,487	5,858	5,140
Wires and cables	5,176	4,057	3,482	2,538
Lamps over 16 V.	352	373	4,981	5,120
Lamps under 16 V.	188	192	1,354	1,465
Other electric lamps	56	50	1,257	1,245
Cycle lighting dynamos	159	735	285	207
Cycle lighting dynamo parts	114	86	31	16
Cycle bulbs	1,043	133	150	204
Bulbs for electric lamps	195	192	1,340	1,560
Electric and other refrigerating machines	718	345	6	3
Electric locomotives	1,836	79	5,107	1,428
Total	41,746	38,786	71,911	65,233

Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances:—

CHEMICALS, ETC.	Price March 13th	Fortnight's inc. or dec.
a Acid oxalic ... ... per cwt.	Suspended	—
a Ammoniac, Sal ... ... per ton		—
a Ammonia, Muriate (large crystal) ... ,,		—
a Borax ... ... ,,		—
a Copper, Sulphate ... ... ,,		—
a Potash Chlorate ... ... per lb.		—
a ,, Perchlorate ... ... ,,		—
a Shellac ... ... per cwt.		—
a Sulphur, Commercial ... ... per ton		—
a ,, Roll ... ... ,,		—
a Soda, Chlorate ... ... per lb.		—
a ,, Crystals ... ... per ton		—
a Sodium Bichromate, casks ... per lb.		—
METALS, ETC.		
b Aluminium, Ingots ... ... per ton	£110	—
b ,, Wire ... ... per lb.	1/3 to 1/9	—
b ,, Sheet and Foil ... ,,	1/6 to 2/9	—
p Babbits Metal and Anti-friction Metals—		
Grade I ... ... per ton net	£197	—
Grade II ... ... ,,	£137	—
Grade III ... ... ,,	£73	—
c Brass (rolled metal 2" to 12" basis) ... per lb.	9¾d.	—
c ,, Tubes (solid drawn) ... ... ,,	1/1½ to 1/1¾	—
c ,, Wire, basis ... ... ,,	10¼d.	—
c Copper Tubes (solid drawn) ... ,,	1/2¾	—
g ,, Bars (best selected) ... per ton	£95	—
g ,, Sheet ... ... ,,		
g ,, Rod ... ... ,,		
d ,, (Electrolytic) Bars ... ... ,,	£62	—
d ,, ,, Wire Rods ... ,,	£65.10s.	—
d ,, ,, H.C. Wire ... per lb.	9 5/8d.	—
f Ebonite Rod ½" dia. & up ... ... ,,	1/10to2/3 + 20%	—
f ,, Sheet ⅛" thick & up ... ,,	1/4 to 1/8 adv.	—
n German Silver Wire, Nos. 1 to 12 ... ,,	2/5	—
h Gutta-percha, fine ... ... ,,	Nom.	—
h India-rubber, Para fine ... ... ,,	1/0½	—
g Lead, English Pig ... ... ,,	£26.10s.	—
g Mercury ... ... per bot.	$207	—
e Mica (in original cases) small ... per lb.	1/3 to 3/–	—
e ,, ,, ,, medium ... ,,	9/– to 18/–	—
e ,, ,, ,, large ... ,,	20/– to 27/6	—
p Phosphor Bronze, plain castings ... ,,	1/2¾	—
p ,, ,, drawn bars & rods ,,	1 3⅜	—
p ,, ,, rolled strip & sheet ,,	1/1¼	—
p ,, ,, wire ... ... ,,	1/3¾	—
o Platinum ... ... per oz.	£10	—
d Silicium Bronze Wire ... ... per lb.	8¾d.	—
g Spelter ... ... per ton	£25.15s.	—
g Tin, Block (English) ... ... ,,	£257	£2.5s. inc.
n ,, Wire, Nos. 1 to 16 ... ... per lb.	4/9	—

Quotations supplied by:—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India Rubber, Gutta Percha and Telegraph Works, Co., Ltd.
g Henry Gardner & Co., Ltd.
h Edward Till & Co.
n P. Ormiston & Sons.
o Johnson Matthey & Co.
p C. Clifford & Sons, Ltd.

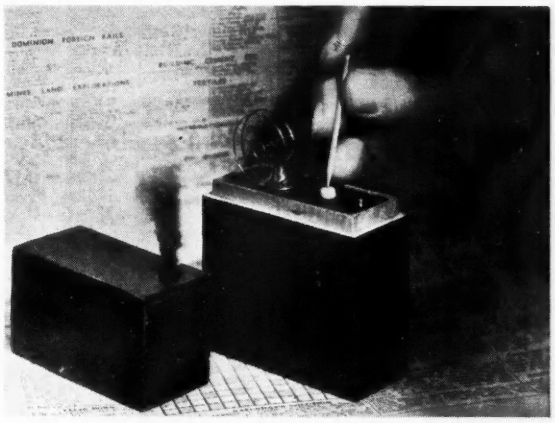
The above table is published here fortnightly. In alternate issues, in which it does not appear, the latest prices of copper, silicium bronze wire, lead, rubber, tin and spelter, up to the time of going to press, are given in this section under the same heading.

Registered Electrical Contractor

At the last meeting of the National Register of Electrical Installation Contractors an application for registration from Mr. F. C. Bennett, Bath, was accepted. One application was withdrawn and another rejected

A Tom Thumb Motor

Particulars of what is probably one of the smallest working DC motors in the world have been sent us by Mr. H. M. Budgett. The overall diameter of the carcase is 0.35 in. and of the armature 0.156 in. The length of the latter with its commutator is 0.3 in. It drives a four-bladed fan 1.2 in. in diameter and the whole unit measures overall approximately 1.4 in. high by 1.25 in. wide by 0.85 in. from back to front. The motor operates at 6 V from dry cells and requires 0.5 A to drive it, 0.3 A for the armature and 0.2 A for the field. The field is shunt wound, the motor refusing to work with a series field, probably owing to the relatively large size of the insulating segments of the commutator. Both the magnets and the armature are wound with No. 46 SWG (0.0024-in.) copper wire insulated with "Formvar" flexible lacquer. The model took twelve months to make. Adjustment of the tension of the silver brushes (0.002 in. thick) so as to give contact without undue friction took several days. For this purpose the armature was mounted in a trial open-field magnet.



The smallness of this electric fan and motor can be gauged by the newsprint in the background

The World's Military Aircraft

The development of military aircraft has been tremendously stimulated by the outbreak of war. This applies not only in Britain, France and Germany, but in every other manufacturing country, and affects all types of machines used for war purposes. The annual Military Aircraft Number of *Flight* now on sale (price 6d.) contains the latest available information regarding the design, equipment, capabilities and possible trends of British and foreign military aircraft, with tables of data indicating the main characteristics of the principal types. Engine development as it affects military aeronautics, and the armament of military aircraft are also dealt with in this specially enlarged number, which includes many exclusive illustrations.

New Catalogues and Lists

Keates & Co. (Electrical), Ltd., 91-93, Bishopsgate, London, E.C.2.—Particularly in view of the blacking-out of factories, a booklet dealing with the lighting of offices and drawing offices prepared especially for the works engineer should be of great assistance. Although the subject is treated in a general way, particular attention is drawn to the "Faraday-Megaphos" lighting system.

R. F. Winder, Ltd., Belgrave Electrical Works, Leeds.—The company's March register of surplus new and second-hand electrical material.

Crypton Equipment, Ltd., North Acton Road, Park Royal, London, N.W.10.—Catalogue containing particulars of emergency lighting equipment for air raid shelters, hospitals, stores, offices, theatres, &c.

British Thomson-Houston Co., Ltd., Crown House, Aldwych, London, W.C.2.—List 7364-6 dealing with a new handlamp transformer.

Information Department

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, &c., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the following:—

COLUMBIA iron.

ELECTRICITY SUPPLY

Attempt to Secure Gas and Electricity Joint Working at Blackburn. Dundee Also Considers Dual Meter Readings. Summer Illuminations at Southport?

Blackburn.—Gas and Electricity Sales Policy.—The hint given by Councillor R. F. Mottershead on March 7th that an early change would be sought in the sales policy of the Electricity Department has caused much speculation. In an interview Councillor Mottershead said he had always considered that the Council made a great mistake in 1935 when, by the Mayor's casting vote, the scheme for joint gas and electricity meter readings, continuous billing and amalgamation of the sales interests of the two undertakings was defeated. Recent budget facts proved that something must be done to assist the Gas Department. If a profit were made charges could be lowered and if there was a surplus the rates would benefit, but with a loss the rates had to provide the deficiency. In the case of the Electricity Department, until a reserve of £100,000 had accrued no surplus could be used to aid the rates. Both Departments produced the means for light and power, and great savings could be effected with one organisation to control supplies. The change need not mean dismissals, but there would be no occasion to replace certain men when the time arose and a future saving would be assured. Continuous billing would follow amalgamation of interests. This would mean a staggered method in paying accounts which would prevent peak periods for the collectors. The scheme would mean a revision of the Gas and Electricity Committees and their activities would be confined to works production. A new Committee would be necessary to deal with sales. He hoped before the next Council that officials would co-operate and present reports showing how the scheme would operate.

Burnley.—Benefits of Hire-purchase.—Since the reintroduction of the hire-purchase system two months ago sales at the electricity showrooms have been twice as great as a year ago.

Chesterfield.—Rate Contribution.—An allocation of £3,000 to the relief of the rates for the year has been approved by the Electricity Committee.

Colchester.—Price Advance.—The Electricity Supply Department will effect a revision of electricity charges as from April 1st, 1940. The total amount of every account in respect of the consumption of electricity and for electrical apparatus, including hire charges, will be increased by 15 per cent., except that the price for electricity for lighting in the extended area will be increased to 8d. per kWh. The chairman of the Electricity Committee (Alderman A. Owen Ward) stated at a meeting of the Town Council on March 6th that had conditions been normal they would have sold 29 million kWh, but owing to black-out the sales would amount to only 27¾ million kWh. This drop in sales meant an estimated loss of £12,000. The deficit for the current year would be met from reserve.

Croydon.—£15,000 Rate Contribution.—In fixing next year's rate at 12s. 8d., an increase og 1s. 4d., the Town Council on Monday approved the transfer of £15,000 from the Electricity Department's balance for the current year in aid of the rates.

Darwen.—Rate Relief.—The Corporation's budget shows that the Electricity Department is expected to contribute £2,500 to the relief of the rates during the ensuing municipal year.

Dundee.—Joint Meter Reading Proposal.—A recommendation that gas and electricity meters should be read by one official and dual accounts rendered to the consumers was discussed at the last meeting of the Elecricity Committee. The convener said they would see from a report by the electrical engineer that this step would definitely be detrimental to the efficiency of the Department, and the convener thought it was quite uncalled for. He said he had reports from all principal cities in Scotland and they had refused to adopt the system, with the exception of Greenock, Perth, and Kirkcaldy. Greenock said that small savings might be made but any large economy was "fictitious." Mr. Bishop, the Dundee electrical engineer, said the undertaking was responsible for maintaining in a safe condition all meters, mains, &c., on consumers' premises. He could not pass that responsibility on to the City Collector's Department. At present his inspectors carried out these duties. It was agreed that the present system should be retained until the chief officials had had an opportunity of discussing the matter.

Felixstowe.—Reduced Discount.—At a recent meeting of the Urban District Council it was decided to reduce the discount for prompt payment of electricity accounts from 5 to 2½ per cent. from April 1st to September 30th, and to review the whole question.

Higham Ferrers.—Supply to Council Houses.—The Town Council has requested the Rushden and District Electric Supply Co. to proceed with the work of installing electricity in Council houses now in course of erection.

Kingston-upon-Thames.—Fire Claim Settled.—It was recently reported to the Town Council that the claim against the insurance company in respect of the fire at Kingston electricity works in December, 1938, had been settled at £19,244 and payment made in regard to property owned by the Corporation, but that the settlement did not cover the consequential losses arising as a result of the fire, which would be the subject of claims against other parties.

Power Station Scheme.—The Council has approved a recommendation that, when necessary, application should be made to the Electricity Commissioners for sanction to capital expenditure on works at the power station to be carried out up to September 30th next and amounting to £19,718, including plant costing £15,334.

Lancaster.—Re-zoning of Undertaking.—It was stated at a recent meeting of the City Council that an application had been made by the trade unions for the re-zoning of the undertaking from "C" to "B."

Lerwick.—Higher Charges.—The Town Council has decided to increase the price of electricity used for lighting, motive power, cooking and heating. The ordinary lighting rate will be 1d. per kWh more and the domestic all-in rate will be raised by ½d.

Lichfield.—Increase in Charges.—The Electricity Committee recommends an increase of 10 per cent. in charges.

Liverpool.—Independent Operation Costs.—The City Council last week passed to the Electric Power and Lighting Committee a request by Councillor J. J. E. Sloan for an immediate report to enable the Council to understand better the method of calculation of the independent operation costs as charged by the C.E.B. for the Electricity supply to the Corporation.

Middlesex.—Electricity Charges.—A resolution was adopted at the last meeting of the County Council asking the Minister of Transport to obtain from the Electricity Commissioners an assurance that the increases in the charges of electricity companies operating in the county, due to the present emergency, did not place upon consumers an unjustified burden. If circumstances warrant it, the Minister will be asked to intervene under the Defence Regulations in order to protect the interests of consumers.

Northern Ireland.—Electricity and a Cleaner Atmosphere.—The question of smoke pollution was raised at a meeting of the Belfast Electricity Committee by Alderman Henderson, M.P., who said he spoke on behalf of the ratepayers and in the interest of the health and well-being of the community. It was his opinion, and the opinion of others who had consulted him, that much of the present smoke nuisance could be overcome by the extended application of electrical apparatus in industry, and by a greater use of electricity in the homes of the citizens. It would mean primarily a purer atmosphere, and also that in domestic work the householder would be greatly helped, especially in cooking and washing. Councillor Hutchinson, a member of the Committee, said that he agreed with the point of view put forward by Alderman Henderson, and hoped it would receive the attention it deserved. They should aim at a big propaganda drive which would bring home the advantages to be derived from the use of electricity.

Scarborough.—Undertaking's Position Improves.—In the nine months to the end of December there was a net surplus of £1,846 on the working of the electricity undertaking, compared with a deficit of £4,756 during the corresponding nine months of the previous year. Working expenses were £2,348 less although sales rose by 174,537 kWh.

Sheffield.—Charges May Be Raised.—In view of the increased costs of production it is expected that electricity charges at Sheffield may be raised by from 5 to 10 per cent. The Department's costs have increased by £378,000, of which £311,000 is directly due to the war.

Southport.—Illuminations This Year?—Although, by a narrow margin, the Publicity and Attractions Committee has rejected a proposal that the town's illuminations on the Promenade and in Lord Street should be switched on at the usual time this summer and off at black-out time, it was stated that the question might be raised before the Council. The chairman of the Committee said it was possible that some compromise might be reached and he was prepared to leave the decision to the Council.

South Shields.—No Rate Contribution.—The Electricity Committee has decided not to make a contribution to the general rates during the year ending March 31st, 1941.

Bulk Supply Charges.—The Committee has recently considered the question of the maximum demand charges made by the North Eastern Electric Supply Co., Ltd., in accordance with the terms of the agreement with the Corporation for the supply of electricity in bulk to the Cleadon area. It has been decided to ask the I.M.E.A. that the financial and technical experts engaged by the Association to consider charges by the Company to the smaller undertakings should attempt to secure a reduction in the maximum demand charges for the Cleadon area.

Stockport.—RATE AID.—In fixing its rate for the forthcoming year the Finance Committee states that this will depend upon the provision of assistance from the reserve funds of the Corporation trading undertakings—£10,000 from the Electricity Department and a similar sum from the Transport Department.

Torquay.—COOKERY DEMONSTRATIONS.—The Electricity Committee is to convert the basement of Electric House for use as a cookery demonstration hall at a cost of £200.

Wallasey.—PRICE INCREASE.—The Corporation is to increase the price of electricity from the end of the present quarter by 15 per cent.

West Ham.—NO IMMEDIATE INCREASE IN CHARGES.—Reviewing the estimates of income and expenditure for the current and ensuing financial years, Mr. J. W. J. Townley, the borough electrical engineer and manager, and Mr. C. A. J. Hunter, the borough treasurer, state that obviously there is no immediate necessity for any change in the existing charges for electricity, but the position will require to be reviewed again early in the 1940-41 financial year. Unless unforeseen circumstances arise, it is unlikely that any addition to charges will be necessary before October next.

Income in 1938-39 was £725,073; for the current year it is estimated at £703,281, and next year at £740,396. The estimated balance for the current year is £21,000, which includes £11,392 brought forward from 1938-39. On the assumption that £9,281 will be carried forward from the present year, the balance at March 31st, 1941, is estimated at just over £6,000.

Worcester.—DISCONTINUANCE OF SIMPLE HIRE.—Because it is felt that the simple hire scheme for cookers, water heaters and wash boilers approved by the Council on December 4th, 1934, has fulfilled its purpose, the system is to be replaced by a credit sales scheme for all classes of electrical apparatus, with a maximum repayment period of five years. A report submitted by the electrical engineer shows that in the four years during which the hire scheme has been in operation the sales of electricity for domestic purposes have risen from 3.3 million to 10.2 million kWh. The public generally has now become electrically minded, it is stated, and the demand for electrical apparatus is likely to grow rather than diminish. It is proposed that all apparatus hired prior to January 1st, 1940, shall remain on hire under the terms of the agreement until this expires. The new scheme provides for the sale of apparatus at the usual retail price with 5 per cent. interest on the outstanding balance. It covers new and reconditioned apparatus, and includes maintenance during the period of repayment.

Workington.—LOANS.—The Town Council has decided to apply to the Electricity Commissioners for sanction to borrow £7,992 for mains, £2,370 for switchgear and £915 for transformers for supplying electricity to new local industries.

Overseas

Denmark.—PEAT AS A FUEL.—A number of industrial undertakings, notably in Jutland, are having their boiler plants adapted for the use of peat. The power company which supplies the whole of the province of Aabenraa, in South Jutland, for example, is converting its plant for the exclusive use of peat. It has acquired some large peat bogs and special machinery, and will consume about fifty thousand tons of peat a year. This scheme, although inspired by the present wartime shortage of imported coal, is actually a permanent arrangement.

Holland.—UTILISATION COUNCIL.—The Electricity Council recently formed by the Dutch Minister of Public Works will consist of sixteen members with Prof. van Swaay as its president. They will represent industrial interests, electrical and otherwise, agriculture, transport, and various social and economic activities. One of the Council's main duties will be to advise the Government on all matters pertaining to the utilisation of electricity, though it is also empowered to make recommendations on its own initiative.

INTERCONNECTION.—The Council can be advised by the still more recently constituted Bureau of Electricity Supply of the Department of Public Works, a more technical body, one of the main functions of which will be the interconnection of generating stations in Holland. The Bureau's director-general is Mr. G. J. Th. Bakker, who has managed the municipal electricity undertaking at The Hague since 1914, and is vice-president of the Conférence Internationale des Grand Réseaux Electrique.

Italy.—VATICAN POWER PLANT.—For reasons of economy the Vatican will shortly generate its own electricity; hitherto this has been supplied by a company. The generating plant will cost about £50,000.—*Reuter.*

Palestine.—RECORD INCREASE IN SALES.—An advance of 19.1 per cent. in electricity sales during 1939 is recorded by the Palestine Electric Corporation, representing the highest increase in its history. Fourteen million kWh more was sold last year than in 1938, as compared with an advance of only one million in that year. Sales in 1939, at 86,083,000 kWh, were twice as much as five years ago.

While Lord Samuel, chairman of the Palestine Electric Corporation and formerly High Commissioner for Palestine, was on a visit to Safad recently, Jewish and Arab leaders appealed to him to try to secure an electricity supply for the town, which is one of the few places in Palestine now without electricity.

TRACTION

Latvia.—RAILWAY ELECTRIFICATION.—The opening of the new hydro-electric station at Kegums, coinciding with a severe shortage of fuel this winter, has revived interest in the railway electrification schemes discussed on and off during recent years. The Director-General of the State Railways last week told a Press assembly that a new scheme had been drawn up for converting the Riga-Ieriki, Riga-Krustpils, Riga-Jelgava and Riga-Tukums lines to electric traction. These lines handle about 50 per cent. of the total railway passenger traffic in Latvia and 36 per cent. of the total freight turnover. The value of imported fuel consumed by the steam engines on these lines is normally about 1.8 million lats annually, and it is estimated that the fuel saving consequent upon electrification will cover the cost of the scheme within a period of twelve years.

London.—ALL-WELDED BRIDGE.—The railway plate-girder overbridge recently designed and erected by the London Passenger Transport Board at Hainault, Essex, is the second welded structure of its kind to be put into service so far in Great Britain. The first was the bridge built in 1938 over Ladbroke Grove on the railway of the same authority. The new bridge has a clear span of 40 ft. between the faces of the abutments with main girders of over 50 ft. A maximum stress of 8 tons per sq. in. in tension was allowed for. The saving in weight is said to be about 20 per cent. compared with a riveted design. Site welding was carried out by the C. & M. Welding Co., Ltd., and "Murex Ironex" and "Overhead" electrodes were used throughout.

Norway.—RAILWAY ELECTRIFICATION.—Reviewing the position a few days ago, Mr. Norgren said that the State Railways were at present using 210,000 tons of coal annually and 54.5 million kWh on the electrified lines. Completion of the Ostfold and Flamsbanen electrification now in progress would raise the electrical haulage power from 42,800 to 66,800 kW. Eight large new electric locomotives were being ordered for the Ostfold line. It is further learned that eight Diesel-electric trains of 1,300 HP each have been ordered for fast passenger services. Each will consist of three lightweight bogie cars with 650-HP Diesel-electric sets at each end, designed to carry 144 passengers at a maximum speed of 120 kilometres per hour.

TROLLEY-BUSES.—The Oslo metropolitan passenger transport undertaking recently ordered the reconstruction of a number of petrol-buses which are being converted for trolley-bus operation. About 30 vehicles will be required to run the city's first trolley-bus service and it is proposed to acquire a substantial number of new trolley-buses for other services. In Bergen, second largest city of the country, it is proposed to re-arrange the entire municipal transport system for exclusively trolley-bus operation.

Sweden.—PETROL RESTRICTION HELPS TRAMS.—The wartime restriction of the use of petrol has resulted in the Göteborg tramways company earning a profit of 210,000 kr. in place of the estimated deficit of 349,000 kr.

ACCELERATED RAILWAY ELECTRIFICATION.—The Government has decided to speed up the electrification of the strategically important railway line from Langsele to the fortified capital of the Norrland region, Boden. The allocation of 8 million kr. made for this purpose two months ago has now been increased to 16 million kr.

HIGH-POWER ELECTRIC LOCOMOTIVES.—The State Railways, which have adhered to a standard type of electric locomotive both for passenger and freight trains since railway electrification began, recently deviated from this practice by ordering a new type of high-power engine for fast passenger trains. It has a weight of approximately 100 tons and a power output of 3,500 HP.

COMMUNICATIONS

Great Britain.—RADIO RELAYS.—The Stoke-on-Trent Highways Committee has decided to take no action at the present time regarding applications for permission to inaugurate relay services.

Russia.—POWERFUL TELEVISION STATION.—A short-wave television transmitter which it is claimed will be the most powerful in the world is to be erected in the Moscow Palace, according to the Moscow radio news bulletin in English. The aerial equipment, 1,000 ft. above the ground, is expected to have a long range, and the main hall of the building will contain a screen 400 sq. metres in area.

Scandinavia.—MORE RADIO LISTENERS.—The outbreak of war gave rise to a large increase in radio listening in Scandinavia. The number of new registrations in Denmark was approximately 58,000 last year, raising the total to 820,000, or 216 sets per thousand inhabitants. In Norway there was an increase of 57,800 listeners, which raised the total number of licences in force to 423,500. In Sweden the licence figure rose by almost 140,000 to an aggregate of 1,330,000. No figures have been published in Finland since last October, when the total was 338,000 licences.

United States.—EXTENSIVE STORM DAMAGE.—It is reported that an ice-storm, the worst for 25 years, which swept over the New York metropolitan area on March 3rd and 4th put out of action more than 10,000 telephone lines. Electricity supply was also extensively disrupted.

FINANCIAL SECTION

New Companies. Returns of Capital. Debenture Charges. Bankruptcies and Liquidations. Reports of Electrical Companies. Dividend Announcements. Stocks and Shares

New Companies Registered

Benton N. Wilby (Electric), Ltd.—Private company. Registered March 4th. Capital, £500. Objects: To carry on the business of manufacturers of and dealers in electrical plant, electric cable and wire, insulating materials, electric fires and cookers, &c. Directors: B. N. Wilby, 29, Westfield Street, Ossett, Yorks; and R. H. Wilby, Rock Cottage, Springstone Avenue, Ossett.

H. L. Bush & Co., Ltd.—Private company. Registered March 5th. Capital, £5,000. Objects: To acquire the business of electrical engineers and contractors carried on by H. L. Bush and C. D. James at 2, Wells Road, Bath, as H. L. Bush & Co. Permanent directors: H. L. Bush, Coombe Valley, Southstoke Road, Bath; and C. D. James, 42, First Avenue, Bath. Registered office: 2, Wells Road, Bath, Somerset.

Haigh Radio, Ltd.—Private company. Registered February 7th. Capital, £500. Objects: To carry on the business of manufacturers and retailers of radio and television receiving sets, radio apparatus, &c. L. Haigh, 28, Russell Avenue, St. Albans, is first and permanent director.

Senator Lamp House, Ltd.—Private company. Registered in Edinburgh March 7th. Capital, £100. Objects: To carry on the business of manufacturers of and dealers in electric lamps, reflectors, lampshades, fires, fans, irons, bells, stoves and electrical plant of all kinds, &c. Directors: O. Senator and Mrs. F. Senator, both of 18. Rowan Road, Dumbreck, Glasgow. Registered office: 13, West Campbell Street, Glasgow.

Procter & Son (Blackburn), Ltd.—Private company. Registered March 8th. Capital, £100. Objects: To acquire the business of a radio dealer and electrician carried on by R. Procter at 86, Victoria Street and 109, Whalley Range, Blackburn, as R. Procter & Son. Directors: R. Procter and Mrs. M. Procter, both of 86, Victoria Street, Blackburn. Registered office: 86, Victoria Street, Blackburn.

Companies' Returns

Statements of Capital

Bullers, Ltd.—Capital, £400,000 in 20,000 preference and 20,000 ordinary shares of £10. Return dated January 3rd, 1940. 15,000 preference and 15,593 ordinary shares taken up. £150,070 paid on 15,000 preference and 7 ordinary shares, £155,860 considered as paid on 15,586 ordinary shares. Mortgages and charges: £150,000.

Century Power & Light, Ltd.—Capital, £100 in 200 shares of 10s. Return dated January 5th, 1940. Seven shares taken up. £3 10s. paid. Mortgages and charges, nil.

Insular Electric Lamp Works, Ltd.—Capital, £5,000 in 500 shares of £10 each. Return dated January 11th, 1940. 100 shares taken up. £20 paid, £980 considered as paid. Mortgages and charges, nil.

Precision-Electric, Ltd.—Capital, £500 in £1 shares. Return dated January 11th, 1940. All shares taken up. £500 paid. Mortgages and charges, nil.

East India Tramways Co., Ltd.—Capital, £135,000 in £1 shares. Return dated January 11th, 1940. 133,334 shares taken up. £133,334 considered as paid. Mortgages and charges, nil.

Batterby & Hefford, Ltd.—Capital, £4,000 in £1 shares. Return dated January 4th, 1940. 3,495 shares taken up. £3,495 paid. Mortgages and charges, nil.

British Electrical Export Co., Ltd.—Capital, £2,000 in 2,000 ordinary shares of £1 each. Return dated July 24th, 1939 (filed February 19th, 1940). 198 shares taken up. £198 paid. Mortgages and charges, nil.

Electricity Services, Ltd.—Capital, £5,000 in £1 shares. Return dated December 14th, 1939. 4,575 shares taken up. £4,575 paid. £60 considered as paid. Mortgages and charges, nil.

Furness Electrical, Ltd.—Capital, £500 in £1 shares. Return dated December 21st, 1939. 430 shares taken up. £119 paid. £311 considered as paid. Mortgages and charges, nil.

Mullard Wireless Service Co., Ltd.—Capital, £10,100 in 10,000 "A" and 100 "B" shares of £1. Return dated December 22nd, 1939. All shares taken up. £9,300 paid on 9,200 "A" and 100 "B" shares. £800 considered as paid on 800 "A" shares. Mortgages and charges, nil.

Brookhirst Switchgear, Ltd.—Capital, £550,000 in £1 shares. Return dated November 20th, 1939. 126,002 shares taken up. £30,502 paid. £95,500 considered as paid. Mortgages and charges, nil.

Rist's Wires & Cables, Ltd.—Capital, £75,000 in £1 shares. Return dated December 11th, 1939. 70,000 shares taken up. £70,000 paid. Mortgages and charges, nil.

Barker's Electric Service, Ltd.—Capital, £1,000 in £1 shares. Return dated December 14th, 1939. All shares taken up. £500 paid. £500 considered as paid. Mortgages and charges, nil.

Multitone Electric Co., Ltd.—Capital, £20,000 in £1 shares. Return dated December 28th, 1939. 16,250 shares taken up. £11,250 paid. £5,000 considered as paid. Mortgages and charges, nil.

R. A. Webber, Ltd.—Capital, £1,000 in £1 shares. Return dated December 22nd, 1939. All shares taken up. £1,000 paid. Mortgages and charges, nil.

Mortgages and Charges

Lomax & Samways, Ltd.—Mortgage on moneys payable under and benefit of certain hire-purchase agreements, dated February 19th, 1940, to secure £300. Holders: Billikin, Ltd., St. Petersgate, Stockport.

Betterlight Power Pack, Ltd.—Debenture charged on the company's undertaking and property, including uncalled capital, dated February 29th, 1940, to secure £600. Holders: Frank S. Johnston, 35, Alkrington Hall Road, South Middleton, Lancs, and Wm. S. Johnston, 15, Towncroft Avenue, Middleton.

Savage & Parsons, Ltd.—Mortgage on works, Bushey, Herts, dated February 23rd, 1940, to secure £11,000. Holders: United Kingdom Temperance & General Provident Institution, 196, Strand, W.C.2.

Geo. W. Glascock & Co. Ltd.—Satisfaction to the extent of £100, on February 24th, 1940, of debenture dated October 26th, 1939, and registered October 30th, 1939, securing £200.

Winding-up Petition

Architectural Constructional and Electrical Utilities, Ltd.—Winding-up petition presented by the Sun Electrical Co., Ltd., to be heard before the High Court on March 18th.

Company Liquidations

Lane Radio (Birmingham), Ltd., Birmingham.—The statutory meeting of creditors was held on March 4th at Birmingham. The statement of affairs disclosed ranking liabilities of £395 and net assets of £88, leaving a deficiency, so far as the creditors were concerned, of £307. A resolution was passed confirming the voluntary liquidation of the company with Mr. J. H. Hudson, of 121, Streetsbrook Road, Shirley, as liquidator, with a committee of inspection.

Thermo Electrical Engineering Co., Ltd.—Winding up voluntarily. Liquidator, Mr. R. Donnelly, 634, Bristol Road South, Northfield, Birmingham.

J. Cowdy & Co., Ltd., electric lamp makers, 4, Rangoon Street, Crutched Friars, London, E.C.3.—First meeting March 15th at Carey Street, London, W.C.2.

Bankruptcy Proceedings

T. L. Sutcliffe, 170, Parkinson Lane, Halifax, Yorkshire, electrical engineer.—At the first meeting of creditors held recently at the Official Receiver's Office, Hallfield Chambers, 71, Manningham Lane, Bradford, it was reported that the gross liabilities were £725, of which £587 was expected to rank for dividend. The assets were estimated to realise £129, and there was a deficiency of £458. Debtor attributed his failure to heavy overhead expenses of another business, and loss on forced sale of effects under rent distraint. The case being a summary one was left in the hands of the Official Receiver, as trustee.

S. B. Juster, radio and electrical dealer, 153, Shirley Road, Croydon.—Receiving order made February 27th on debtor's own petition. First meeting March 19th at 195-203, Waterloo Road, London, S.E.1. Public examination April 11th at the County Court, Scarbrook Road, Croydon.

H. W. Blythe, radio dealer, 64, High Street, Bognor Regis.—First and final dividend of 1s. 6d. in the £, payable at 8, Old Steine, Brighton.

R. A. Young, electrical and mechanical engineer, Gullet Passage, Shrewsbury.—Receiving order made February 29th on debtor's own petition. First meeting March 15th at the Official Receiver's office, 22, Swan Hill, Shrewsbury. Public examination April 3rd at the Shire Hall, Shrewsbury.

S. V. Knight, electrical engineer, 10a, Watford Way, Hendon.—Receiving order made March 1st on debtor's own petition. First meeting March 18th and public examination April 18th, both at Bankruptcy Buildings, Carey Street, W.C.2.

F. W. T. Layton and **R. E. Mills**, trading as the East Anglian Wireless Co., wireless engineers, Hamilton Road, Felixstowe. (Separate application of R. E. Mills.).—Order made February 7th suspending the discharge of R. E. Mills for one month.

Reports and Dividends

The Scottish Power Co. reports a revenue balance for 1939, including £11,209 brought in, of £378,560, as compared with £392,269 in the previous year. The ordinary dividend for the year is maintained at 8 per cent., by the final payment of 5½ per cent., loan interest requires £9,079, and £35,000 is placed to reserve. The balance carried forward is £12,131.

At the annual general meeting on March 8th Mr. G. Balfour, chairman of the company, said that the accounts were satisfactory in spite of a diminution of receipts during the last few months. Tariff reductions in the second quarter of last year were not being withdrawn, although subsequent events were robbing them of the anticipated increase in business. Last year they further co-ordinated supplies throughout the Highland area. The separate Orders relating to the Beauly, Ellon and Kintore undertakings were revoked and the Grampian Co.'s lower charges were made available in these areas.

The hydro-electric and steam generating plants operated satisfactorily and 281 miles were added to the transmission and distribution systems during the year. Of these 161 miles were high-voltage and 120 miles low-voltage, making in all a total of 3,978 miles of mains in service. The consumers connected rose by 9,191 to 39,834. Supplies were afforded during 1939 to two additional burghs and thirty-four villages and they now served a total of 103 burghs and 321 villages.

In addition to supplies to the C.E.B. the Grampian Co. sold 190 million kWh.

an increase of over 18 million kWh. The average price per kWh paid for power and domestic supply throughout their areas was 1.35d., compared with 1.375d. in the previons year, which reduction did not reflect the real benefit of the reduced tariffs to consumers as the lowered consumption in the last few months of the year increased the average charge under the two-part tariff.

Mr. Balfour referred to the great increase in the amount of rates paid by the group of companies. With regard to the prospects for the current year, they could assume that the additional business connected in 1939 would enable them to maintain or slightly improve upon last year's performance.

The Llanelly and District Electric Supply Co., Ltd., reports a net profit for 1939 of £79,314, as against £83,160 for the preceding year. The first and final dividend is 5½ per cent. (unchanged).

At the annual meeting on Monday Mr. Morrice A. Edwards, the chairman, said that the improvement in trade and industry in their area to which he referred at last year's meeting had continued. Domestic supplies steadily improved during the first eight months of the year, but received a sharp setback on the introduction of the lighting restrictions. The company and its subsidiary now supplied 25,035 consumers, an increase of 1,322 during the year. With regard to the future, the industrial load already connected should show a progressive increase and offset the deficiency in supplies to domestic and business purposes and for public lighting purposes. Unless unforeseen conditions arose, they should be able to carry on without any increase in charges to general consumers during the current year.

The North Eastern Electric Supply Co., Ltd., reports a total profit of £1,582,876 for 1939, £72,996 more than in the preceding year. From this total is allocated £240,428 (£244,132) for debenture stocks, loans, &c.; £101,127 (£96,748) for sinking funds; £150,000 (nil) for taxation reserve; £500,000 (£475,000) for special depreciation and contingencies, other than equalisation of dividends; and £70,000 (£75,000) for plant renewals. General reserve receives no appropriation as compared with £100,000 last year. Dividends on the 7 per cent. cumulative preference and on the 5 per cent. preference again amount to £185,482, while a final dividend of 4½ per cent. on the ordinary shares, making 7 per cent. and absorbing £333,194, leaves £220,688 (£218,044) to be carried forward. Excluding supplies to the Central Electricity Board for use outside the company's area, electricity sold amounted to 1,240.5 million kWh (1,178.9 million kWh). Capital expenditure during the year, representing extensions to power stations and to transmission and distribution systems, totalled £654,680 (£830,266). Meeting: March 20th at Newcastle.

Siemens & Halske (Berlin) report a net surplus of Rm. 16,250,000 for 1938-39, as compared with Rm. 13,460,000. The dividend on the old ordinary shares is maintained at 10 per cent. and 5 per cent. is paid on the new preference shares. The special reserve is raised to Rm. 51,000,000 by the allocation of Rm. 21,000,000 in connection with the absorption of Schuckertwerke, Nuremberg.

The Rawlplug Co., Ltd., records a net profit of £62,060 for 1939, as compared with £59,447 in the previous year. Income tax, N.D.C. and E.P.T. required £26,575 (against £18,683), while dividends on the first and second preference shares took £5,250 and £7,500 respectively. A sum of £4,953 (£5,000) goes to reserve, making £65,000, and after paying a final dividend on the ordinary shares of 30 per cent., making 40 per cent. for the year (same), £25,152 (£22,245) is carried forward. Meeting: March 19th at Rawlplug House.

The Llandudno and Colwyn Bay Electric Railway, Ltd., increased its net operating revenue by £562 last year, the total being £4,339. After allocating £1,495 to depreciation and £1,479 to debenture interest, there is £1,365 divisible as to 25 per cent. (£341) for sinking fund and 75 per cent. (£1,023) for preferred ordinary dividend. Meeting: March 19th at Basildon House, Moorgate, London, E.C.

The County of London Electric Supply Co., Ltd., reports a total revenue for the year ended December 31st of £5,695,720, an increase of £421,927 as compared with 1938, and after deducting expenses, there is a net revenue of £2,609,526 (against £2,723,762), to which is added £653,527 brought in, making £3,263,053. From this the following deductions are made:—Debenture and loan interest, £377,262; provision for difference between issue and redemption price of debenture stock, £6,759; reserve for depreciation, including contributions to sinking funds under London Electricity (No. 1) Act, 1925, £929,015; taxation reserve, £200,000; staff superannuation reserve, £30,000; contingencies, £50,000; transferred to (No. 2) reserve fund, £25,000. The ordinary dividend for the year is maintained at 10½ per cent. by the final payment of £7 3s. 1d. per cent., and £602,972 is carried forward.

The sales of electricity to the company's consumers during 1939 totalled 1,410.3 million kWh, as compared with 1,325.1 million kWh in 1938. In addition, 614.5 million kWh was exported to the Central Electricity Board. The transmission and distribution network was increased by 339 miles of underground mains and overhead lines and an additional 100 transforming stations were added to the system. In July last shareholders authorised the conversion into stock of the 1,250,000 ordinary shares issued in December, 1938. Owing to war conditions, it was found necessary to introduce increased charges to consumers, to be effective from January 1st. At the date of the report 1,500 men of the company and its associated companies were serving with the Forces. Allowances were being made by the company to those employees. Meeting: March 19th.

The Newcastle and District Electric Lighting Co., Ltd., reports a gross profit of £69,385 for 1939, as compared with £74,984 for the preceding year, to which is added £16,244 brought in, making £85,629. After providing for debenture interest, depreciation, &c., there is a balance of £42,299. The dividend for the year is maintained at 7 per cent., less tax, and £14,999 is carried forward.

The Telegraph Construction & Maintenance Co., Ltd., reports a net profit of £37,973 for 1939, after placing £25,000 to contingencies, £18,000 to taxation, £11,388 to pensions, and fees £6,310. It is proposed to pay a final dividend of 5 per cent. again making 10 per cent., less tax, for the year. Dividends absorb £37,350, leaving £623, which with £32,440 brought in makes £33,063 to be carried forward.

Following the annual meeting on March 19th an extraordinary meeting will be held to consider a resolution to capitalise £18,675 of undivided profits and to distribute this amount as a 5 per cent. bonus share issue. It has also been decided to issue a further 62,250 shares of £1 at £1 10s. per share payable in full on allotment. These shares will be offered to existing shareholders in the proportion of one new share for each six shares held.

The Hoffmann Manufacturing Co., Ltd., reports a net profit for 1939 of £250,760, as compared with £221,141 for 1938. Debenture redemption reserve receives £50,000, general reserve £50,000, and £25,000 is set aside for pensions. The final ordinary dividend is 10 per cent., again making 17½ per cent., tax free, for the year, and £57,771 is carried forward (against £57,011 brought in).

Bruce Peebles & Co., Ltd., report a profit for 1939, after providing for A.R.P. and tax, of £43,157, as compared with £33,757 in the preceding year. The ordinary dividend for the year is unchanged at 5 per cent., but the bonus is raised from 2 to 3 per cent. The balance carried forward is increased to £10,648.

The Consolidated Signal Co. reports a profit for the year to September 30th of £25,441, as compared with £49,606 for 1937-38. The ordinary dividend for the year is 17 per cent. (against 36½ per cent.), and £1,382 is carried forward (against £1,154 brought in). The principal asset of the company consists of stock in the Westinghouse Brake & Signal Co.

The British Thomson-Houston Co., Ltd., announces a profit for 1939, before providing for taxation, of £1,038,046, as compared with £970,644 in 1938. The provision for taxation is increased from £300,000 to £410,000, while £287,087 (£226,941) goes to depreciation. General reserve receives £100,000 instead of £200,000. The ordinary dividend is maintained at 7 per cent. and £192,058 (£182,829) is carried forward.

British Insulated Cables, Ltd., record a slight decline in profits for 1939, from £807,874 to £783,224. Depreciation and directors' fees take £175,643 (£175,808) and £100,000 (nil) is transferred to war contingencies reserve account, the reserve account receiving £13,334 (£100,000). A final dividend of 10 per cent., plus a cash bonus of 5 per cent., making 20 per cent. for the year (same), is to be paid on the ordinary stock and £488,305 (£486,558) is carried forward.

Central London Electricity, Ltd., reports a decrease in its net profit from £331,899 in 1938 to £185,031 last year. To this are added £137,991 brought in and £47,410 from No. 2 reserve, making £371,433 (£584,870). Preference dividends take £75,399 (same) and the interim ordinary dividend £159,205 (same). A final dividend of 6.18d. (4 per cent.) on the ordinary stock will require £136,651 (£212,274), leaving £176 to be carried forward. Capital expenditure during the year amounted to £339,612. During the first eight months of the year 25,152 kW was connected to the company's mains. During the last four 4,832 kW was connected but 49,700 kW disconnected, making a net decrease of 44,868 kW.

The London Associated Electricity Undertakings, Ltd., showed a net profit for 1939 of £376,403, as against £447,388 in 1938. The final ordinary dividend of 2½ per cent. makes 5½ per cent. for the year (as compared with 7 per cent.) and £297 (£571) is carried forward. The sales of electricity of Central London Electricity, Ltd., in the last four months of the year were reduced by 27 per cent., and the net profit of this company, after sinking fund allocations and tax, fell from £331,899 in 1938 to £186,032. In the early part of 1939 an increase of 7½ per cent. was made in charges for electricity, but this was not designed to meet war conditions for which further increases had been made.

City of London Electric Lighting Co., Ltd.—Presiding at the annual general meeting on Wednesday last, Mr. P. D. Tuckett, chairman, in the course of his speech said that since the outbreak of war there had been a marked decline in their output and revenue. Up to that time, however, they had continued the steady progress they had maintained for so many years. Coupled with decreased output owing to evacuation, blackout, &c., were increased working costs but the increase in charges to their consumers, which was inevitable under such conditions, had been postponed until the commencement of the second quarterly period of 1940. In this move of increasing charges they realised that unless output expanded during 1940, their available revenue at the end of the year would be appreciably smaller than that of 1939.

The Midland Electric Manufacturing Co., Ltd., reports a net profit of £48,834 for 1939, as compared with £52,386 in the preceding year. The first and final dividend is 10 per cent., plus a bonus of 15 per cent. (same).

Enfield Cable Works, Ltd., is again paying a final ordinary dividend of 10 per cent., maintaining the distribution for the year at 16¼ per cent. The net profits for 1939 were £180,603, as compared with £185,250 for 1938.

Hoover, Ltd., reports a net profit for 1939 of £248,412, as compared with £338,515 for 1938. The final ordinary dividend is 11⅞ per cent., making 15 per cent. for the year (against 25 per cent.).

The Woking Electric Supply Co., Ltd., is paying a final dividend of 4½ per cent., making 7½ per cent. for the year, tax free (same). The net profit for 1939 was £42,354, as against £29,690.

The Hydro-Electric Securities Corporation has declared a dividend of 20 Canadian cents gross on the common shares. A similar payment was made a year ago.

Crabtree Electrical Industries, Ltd., is again paying an interim dividend of 5 per cent.

The Northampton Electric Light & Power Co., Ltd., held its annual general meeting on March 8th when Lord Henley, chairman, who presided, said that the report and balance sheet showed

(*Concluded on page 328.*)

STOCKS AND SHARES

TUESDAY EVENING.

THE paramount importance of the new War Loan has been sufficient to bring Stock Exchange business in other markets to something like a standstill. The whole effort of the investor is concentrated upon making the issue such a success as will impress not only our own public, but also that of the United States and of Europe. The subscription lists close on Wednesday in this week. That the £300,000,000 would be well over-subscribed was taken for granted and, in advance, the price of the old War Loan rose to nearly 100. A certain amount of selling took place in various markets on behalf of people who wanted to realise holdings in order to invest the money in the new stock; but, in spite of this, prices have kept very firm. An outstanding feature of the last day or two has been further improvement in the prices of Home Railway stocks.

The new War Loan is of a character which appeals to practically every type of investment. It is generally agreed that a much larger amount would be readily subscribed at the terms offered. The fact of this loan being limited to the comparatively small proportion of what will eventually be required is taken as a sign that the course of the borrowing programme is more likely to be the reverse of what happened in the last war, when loans were floated at successively higher rates of interest. In the week of preparation for the newcomer, prices in the gilt-edged market remained, on balance, little different from those previously ruling. Central Electricity stocks are unchanged on the week. London Passenger Transport issues lean to the lower side.

Electricity Supply Profits

Opinion in the Stock Exchange market for home electricity supply shares is favourably impressed by the dividend announcements from London and Provincial companies alike. The distributions are well up to expectations; in some cases they are better than had been looked for. A few reductions were so generally anticipated that when the announcements appeared, the first effect was to strengthen rather than weaken the share prices. Upon the gilt-edged market going back a shade, the front-rank industrials followed suit.

With the black-out, the evacuations, and the rising cost of transport, no surprise would have been felt had the London companies reduced their dividends fairly severely. The Provincial undertakings were known to have been partially compensated for reduction in revenue, caused by wartime regulations, by the demand for additional power required in the industrial areas. Making all allowance for both factors, the dividend declarations are regarded as satisfactory. Moreover, they are deemed to prelude the maintenance of similar rates. Some of the companies have dipped into their contingency funds in order to maintain dividends, but this is considered quite legitimate policy for them to follow; in no case has the transfer from reserve been of appreciable amount. In the current year it is thought likely that the companies will be able to carry on without having recourse to reserves of any kind, and, on this account, prices in the share market remain firm.

Other Company News

Mr. Oliver Bury had a similar tale to tell at the London Electric meeting. Despite a 9 per cent. increase of sales in the first part of the year, the difficulties of the later months brought down the year's net revenue from £100,000 to £67,000. On balance, however, the company was able to maintain the dividend at the equivalent of 7 per cent., at which the yield on the shares, at 27s., comes to £5 3s. 8d. per cent. The Chairman made no attempt to foresee what the future had in store. In the case of County of London Electric, the full report shows that the fall of revenue in the war months was largely offset by expansion in the first part of the year, leaving net revenue £114,000 down at £2,610,000. A strong financial position is maintained. The shares, at 40s. 9d., pay £5 3s. per cent. on the money. The Northmet Power Company drew on the contingency fund to the extent of £100,000 in order to keep the dividend at 10 per cent., revenue having contracted from September onwards. At 41s. 3d., the shares give a return of £4 17s. per cent. The British Power and Light group continued to increase sales during the year, and although higher taxation and dividends on the newly issued preference shares absorbed the resultant increase in revenue, the accounts show the 7 per cent. dividend to be again comfortably covered by earnings. The price has gone back 1s. to 28s. 6d.

Further Reports

Following last week's annual meetings of the Metropolitan Electric and London Electric companies, and the publication of the full accounts of County of London Electric, the market is now in possession of most of the details of the London electricity supply position. The Metropolitan Company's experience, as reviewed by Mr. George Balfour, may be taken as typical. The outbreak of war put a spoke in the wheel of progress based on successive lowering of charges to stimulate increasing consumption. A halt has been called to the normal expansion programme, and capital expenditure has been cut to the bone; higher costs on top of smaller demands, caused by evacuation and black-out, have necessitated increases in charges. In the mid-London area, the war turned an increase of 8 per cent. in output for the first half of the year, into a drop of 21 per cent. in the second. Notwithstanding these problems, the shareholders were told that, if conditions remain as they appear to be at present, the Company can look forward to a not unsatisfactory year. A yield of 5 per cent. on the shares, at 40s., shows confidence on the part of shareholders.

The North Eastern Electric profits are £72,300 up, and the dividend on the ordinary shares is again 7 p.c. The price, 30s. 6d. is ex the dividend. Electrical Distribution of Yorkshire ordinary are 6d. higher at 38s. 9d. Net revenue is £10,095 down; the dividend is maintained at 9 p.c.

Notting Hill Preference

The £10 six per cent. preference shares of Notting Hill Electric are still quoted over par, notwithstanding the passing of the latest half-yearly interest. Reference to the position was made at the annual meeting of Metropolitan Electric, the controlling concern. It transpires that the half-year's dividend paid was met only by the aid of a transfer from the reserves, and a waiving of part of the management fees. Evidently, however, the position is not one to cause serious anxiety, for it is officially hoped that the dividend arrears will be cleared off at an early date.

Equipment and Manufacturing

Apart from the low standard of yields now established in the gilt-edged market, and the consequent quest for higher returns in other fields of investment, one of the chief influences behind the recent upward stride of industrial share-prices was thought to be the first Treasury requisitioning of British holdings of American stocks, and anxiety to anticipate reinvestment of the proceeds in British stocks and shares. Now that repayments are actually taking place, the pace has slackened perceptibly. For the present, business is selective and has so far failed to carry out last month's promise of developing activity over a broad front in the industrial markets. The new War Loan has, of course, arrived at the moment opportune for tapping the flow of repatriated money, as well as the plentiful funds already awaiting investment. The market in electrical equipment issues covers a number of those shares which, being in the front rank of equity investments, have been in particular favour of late. Generally speaking, these are being maintained at prices which show appreciation of useful order over the past month, and at which the yields on the last-paid dividends—mostly for 1938—are down to 5 per cent., and in some cases less. Among this week's chief price changes are the advances in Lancashire Dynamos to 61s. 3d., Consolidated Signals to 65s., and Reyrolles to 60s.

Cable and Wireless Estimates

The financial year of Cable and Wireless (Holding) Ltd., ends with December 31st and the annual report usually appears in he middle of May. The dividend on the ordinary stock, when there is one, is announced about a month earlier; this year it is expected to be declared in the middle of April and estimates are rife as to what the combine will distribute. For 1937 and 1938 the dividend was 4 per cent. in each year. Optimism talks about a possible 5 per cent. to be declared next month; caution looks for a repetition of the previous 4 per cent., which would give the stock a yield, at the present price, of about 6¼ per cent. on the money.

Telegraph Construction

A satisfactory report from Telegraph Construction and Maintenance has been duly signalised by an improvement of 4s. 6d. to 41s. 3d., ex dividend, in the price of the shares. Profits are shown to work out at almost precisely the same figure as for the two previous years (a coincidence which some people are disposed to take as evidence of inside reserves being built up before the striking of the balance). A 10 per cent. dividend is being paid for the third successive year, together with a 5 per cent. scrip bonus. In addition, the Treasury has given consent to an issue of new capital, of which shareholders are to be offered one share at 30s. for each six held. Seeing that the rights to this offer are of material value, shareholders have every reason to be pleased with the total outcome of the year's trading.

Miscellaneous Matters

It is announced that the dividend on Canadian Marconi shares of 4 cents—the maiden distribution since the company was formed in 1901—will be paid on June 1st next. The amount is estimated as a little under 2d. per share; actually about 1¾d. The shares are now of the nominal value of $1 each, having been reduced from their previous nominal of $5. In the latter guise the price touched, at one time, 98s. 9d. in London owing to a squeeze that occurred in the New York Stock Exchange. Under present conditions, the Canadian Marconi should be doing well, and the 4 cents dividend may prove a preliminary gesture of what the company is capable of distributing in the near future.

Brazilian Tractions advanced further to 10¼. It is announced that Brazil (very unexpectedly) intends to make partial cash payments on certain of her external bonds. Oriental Telephones have again met with support; the price is 2s. 6d. higher at 55s. The demand is probably due to the anxiety of investment to secure shares upon which dividends are being paid free of income tax. Victoria Falls ordinary hardened to 75s. in sympathy with improvement in some of the leading Kaffir shares.

ELECTRICAL COMPANIES' SHARES

Prices, Dividends and Yields

Company	1939 High-est	1939 Low-est	Dividend Pre-vious	Dividend Last	Price March 12	Rise or Fall	Yield p.c. £ s. d.
Home Electricity Companies							
Bournemouth and Poole ...	68/3	56/-	15	15	62/6xd.	+⅛	4 16 0
British Power and Light ...	30/9	21/-	7	7	28/6	−1/-	4 18 3
City of London	33/9	22/-	7½	7½	26/6	−6d.	5 13 2
Clyde Valley	38/6	26/9	8	8	37/6	—	4 5 5
County of London... ...	46/9	28/-	10½	10½	40/9	−6d.	5 3 0
Edmundson's :							
7% Pref....	31/6	27/6	7	7	30/-	—	4 13 4
Ord.	27/9	18/-	9	6	27/-	—	4 9 0
Elec. Dis. Yorkshire ...	41/6	32/-	9	9	38/9	+6d.	4 13 0
Elec. Fin. and Securities ...	48/3	39/-	12½	12½	40/-	—	6 5 0
Elec. Supply Corporation...	51/9	40/-	12	12	44/-	—	5 9 0
Isle of Thanet	20/-	15/-	4	4	15/6	—	5 3 3
Lancs Light and Power ...	34/6	25/-	7½	7½	32/6	—	4 12 4
Llanelly Elec.	22/6	16/6	5½	5½	21/-	—	5 4 9
Lond. Assoc. Electric ...	30/-	18/-	7	7	20/-	—	7 0 0
London Electric	34/3	20/-	7	7	27/-	—	5 3 8
London Power Deb. Red....	106½	97	5	5	104½	—	4 15 6
Metropolitan	51/-	32/6	12	10	40/-	—	5 0 0
Midland Counties	39/6	30/-	8	8	37/6	−9d.	4 5 4
Mid. Elec. Power	41/9	33/6	8	9	37/6	—	4 16 0
Newcastle Elec.	28/9	25/-	7	7	28/9	—	4 17 5
North Eastern Electric :							
Ordinary...	32/3	23/6	7	7	30/6xd.	—	4 11 10
7% Pref....	32/6	26/-	7	7	31/-xd.	—	4 10 4
Northampton	48/-	41/-	10	10	42/6	—	4 15 0
Notting Hill 6% Pref. (£10)	13½	10½	6	6	10½	—	—
Northmet Power :							
Ordinary...	46/6	30/6	10	10	41/3	—	4 17 0
6% Pref....	29/-	23/6	6	6	28/6	—	4 4 3
Richmond Elec.	29/-	21/6	7	7	23/9xd.	+6d.	5 18 0
Scottish Power	38/9	27/6	8	8	36/3	—	4 8 4
Southern Areas	22/9	17/-	5	5	20/6	—	4 17 7
South London	30/9	22/-	7	7	22/6xd.	+6d.	6 4 3
West Devon	23/3	18/-	5	5	18/9	—	5 6 8
West Glos.	21/3	15/-	2	2½	18/9	—	2 13 4
Yorkshire Elec.	38/6	27/9	8	8	38/9	—	4 2 5
Overseas Electricity Companies							
Atlas Elec.	4/3	1/6	Nil	Nil	3/9	+3d.	—
Calcutta Elec.	39/-	25/-	10*	10*	35/-	—	—
Cawnpore Elec.	34/6	27/3	10	10	28/9	—	—
East African Power ...	26/3	20/-	7	7	24/6	—	5 14 3
Jerusalem Elec.	24/6	21/-	7	7	24/-	+1/-	5 16 8
Kalgoorlie (10/-)	10/6	9/-	7½	7	12/6	—	5 12 0
Madras	31/-	21/3	8*	8*	26/3	—	—
Montreal Power	35½	30	1½	1½	33½	+½	—
Palestine Elec. " A " ...	27/3	19/6	7½*	5*	25/-	—	4 0 0
Perak Hydro-electric ...	19/6	12/6	6	2½	18/9	—	2 13 4
Shawinigan Power ...	25	20	83cts.	90cts.	23½	+½	—
Tokyo Elec. 6%	63	33	6	6	70	—	8 11 6
Victoria Falls Power ...	73/9	60/-	12½	15	75/-	+½	4 0 0
Whitehall Investments Pref.	19/6	10/-	7½	7½	17/-	−6d.	8 16 6
Public Boards							
Central Electricity :							
1950–70	112	103	5	5	109	—	4 11 7
1955–75	115½	104½	5	5	111xd.	—	4 10 0
1951–73	106½	101	4½	4½	107	—	4 4 0
1963–93	95½	84	3½	3½	95½	—	3 13 8
London Elec. Trans Gtd....	88½	83	2½	2½	91½	—	2 10 4
London & Home Counties							
1955–75	107⅞	105	4½	4½	106½	—	4 4 6
Lond. Passenger Transport							
A	114⅛	103	4½	4½	111½	−½	4 0 9
B	117⅞	102	5	5	108⅝	−1	4 12 4
C	83½	64½	1½	—	44½	−1½	—
West Midland Joint Elec.,							
1948–68	112½	104½	5	5	106½	—	4 14 0
Telegraph and Telephone							
American Tel. & Tel. ...	210	159	9	9	212½	+2	4 4 8
Anglo-Am. Tel. :							
Pref.	101½	82	6	6	99½	+1	6 0 10
Def.	23⅛	17	1½	1½	23	—	6 10 4
Anglo-Portuguese	24/-	16/6	8	8	22/6	—	7 2 3
Cable & Wireless :							
5½% Pref.	97	75	4½	5½	97½	+1	5 12 8
Ord.	57½	35	4	4	61½	−1	6 10 0
Income	100	85½	—	—	99½	—	4 0 5
Canadian Marconi $1 ...	6/-	3/9	Nil	4cts.	5/6	—	—
Globe Tel. & Tel. :							
Ord.	32/3	22/6	7½*	7½*	31/3	—	4 16 0
Pref.	26/9	20/-	6	6	27/6	—	4 7 5
Great Northern Tel. (£10)...	38	18	20	20	19½	—	10 5 4
Inter. Tel. & Tel.	10½	5	Nil	Nil	5	—	—
Marconi-Marine	30/-	23/-	7½	10	30/-	—	6 13 4
Oriental Telephone Ord. ...	2½	42/6	12*	12*	2⅝	+½	4 7 5
Telephone Props.	14/-	12/9	5	6	13/9	—	8 14 6
Telephone Rentals (5/-) ...	10/-	6/3	10	10	8/9	+3d.	5 14 3
Western Union	40½	19½	2½	—	32½	—	—
Traction and Transport							
Anglo-Arg. Trams :							
First Pref. (£5)	7/6	3/6	Nil	Nil	4/-	—	—
4% Inc.	16	5	Nil	Nil	9	—	—
British Electric Traction :							
Def. Ord.	950	500	5	5	800	—	—
Pref. Ord.	164	115	8	8	165	—	4 17 0
Bristol Trams	52/6	35/-	10	8*	48/3	—	3 6 6
Brazil Traction	13	6½	$1	50c.	10½	+½	—
Calcutta Trams	25/6	20/9	8	8	23/6	—	6 16 2
Cape Elec. Trams	18/-	16/9	5	5	17/-	—	5 17 8
Lancs Transport	37/9	27/6	10	10	35/-	+⅛	5 14 8
Mexican Light :							
1st Bonds	35	20	5	5	30½	—	—
Rio 5% Bonds	82	47	5	5	85	+2½	5 17 8
Southern Rly. :							
5% Prefd.	75½	48	5	5	73½	+½	6 16 0
5% Pref....	99½	79	5	5	102½	—	4 17 6
T. Tilling	2½	32/6	10	10	43/9	−9d.	4 11 4
Tilling & B.A.	54/6	43/9	9*	8*	47/6	—	3 7 10
West Riding	37/9	30/-	10	10	34/6xd.	+9d.	5 16 8
Equipment and Manufacturing							
Aron Electricity Ord. ...	32/3	17/6	15	15	17/6	—	—
Assoc. Elec. :							
Ord.	45/3	30/-	10	10	42/6	—	4 14 0
Pref.	36/6	30/-	8	8	35/-	—	4 11 5
Automatic Telephone & El.	48/9	37/-	10	12½	47/6	—	5 5 2
Babcock & Wilcox ...	48/-	37/-	10	12½	47/6	−⅛	5 5 2
British Aluminium Ord. ...	61/3	48/-	12½	12½	54/6	+9d.	4 11 9
British Insulated Ord. ...	88/-	70/3	20	20	91/3	⅛	4 7 9
British Thermostat (5/-) ...	16/-	11/6	18½	18½	15/-	—	6 3 4
British Vacuum Cleaner (5/-)	22/6	8/-	40	12½	12/6	—	5 0 0
Brush Ord....	5/9	2/6	Nil	Nil	4/6	—	—
Callender's	92/-	50/-	20	15	67/6	—	4 9 0
Chloride Elec. Storage ...	82/-	62/-	20	15	3½	—	4 5 9
Consolidated Signal ...	96/-	60/-	36½	17	3½	+½	5 4 7
Crabtree (10/-)	25/6	16/6	17½	17½	24/6	—	7 1 8
Crompton Parkinson :							
Ord. (5/-)	21/-	12/6	15	20	20/-	—	5 0 0
E. K. Cole (5/-)	9/-	2/6	10	Nil	3/6	—	—
Elec. & Musical Industries							
(10/-)	14/9	6/6	5	Nil	9/3	+3d.	—
Electric Construction ...	40/6	28/-	12½	13½	36/3	—	7 8 4
Enfield Cable Ord. ...	58/-	37/6	25	16⅔	55/-	—	5 18 3
Electrical Switchgear (10/-)	27/-	23/-	16	10	21/3	—	4 14 3
English Electric	36/6	25/-	10	10	33/3	—	6 1 0
Ensign Lamps (5/-) ...	16/9	13/9	25	25	15/-	—	8 6 8
Ericsson Tel. (5/-) ...	43/-	32/3	25*	25*	37/6	—	3 6 8
Ever Ready (5/-)	26/6	16/9	35	30	27/6	+3d.	5 19 2
Falk Stadelmann	27/-	18/-	10	6	17/6	—	6 17 4
Ferranti Pref.	25/6	21/-	7	7	23/9	—	5 18 0
G.E.C. :							
Pref.	32/9	25/-	6½	6½	32/6	—	4 0 0
Ord.	82/-	61/-	17½	20	82/6	—	4 16 10
Greenwood & Batley ...	29/-	20/-	7	15	25/-	—	12 0 0
Hall Telephone (10/-) ...	22/3	7/-	15	15	18/9	—	8 0 0
Henley's (5/-)	21/-	13/9	20	20	20/9	—	4 18 1
4½% Pref.	23/-	18/-	4½	4½	20/-	—	4 10 0
Hopkinsons	46/9	37/-	12½	15	46/3	—	6 9 10
India-Rubber Pref. ...	22/-	17/9	5½	5½	20/-	—	5 10 0
Intl. Combustion	121/3	97/-	32½	32½	5⅞	—	5 10 6
J. Lucas	61/-	42/6	15	15	60/-	—	5 0 0
Johnson & Phillips ...	42/6	32/-	12½	12½	47/6	—	5 5 1
Lancashire Dynamo ...	72/-	50/-	25	25	61/3	+⅜	8 3 4
Laurence Scott (5/-) ...	12/-	8/6	15	15	10/-	—	7 10 0
London Elec. Wire ...	31/6	25/-	12	7½	25/-	—	6 0 0
Mather & Platt	50/3	37/6	13½	10	40/9	−1/9	4 18 1
Metropolitan Elec. Cable Pf.	21/3	21/-	5½	5½	21/3	—	5 3 6
Murex	85/9	63/9	20	20	83/9	−⅛	4 15 6
Pye Deferred (5/-) ...	11/6	7/-	25	25	7/6	—	16 13 4
Revo (10/-)	35/6	22/-	17½	17½	22/6	—	7 15 7
Reyrolle	61/-	52/-	12½	12½	60/-	+⅛	4 3 4
Siemens Ord.	26/9	17/-	7½	7½	23/9	—	6 6 4
Strand Elec. (5/-) ...	5/6	1/3	10	4	2/-	—	8 0 0
S. Smith (1/-)	9/6	5/6	37½	50	7/6	—	6 13 4
Switchgear & Cowans (5/-)	15/-	9/6	20	20	11/3	—	8 18 0
Telegraph Condenser (10/-)	7/6	5/-	5	—	8/9	—	—
Telegraph Construction ...	2½	27/6	10	10	41/3xd.	+4/6	4 17 0
Telephone Mfg. (5/-) ...	10/-	7/-	9	9	8/6	−3d.	5 2 10
Tube Investments... ...	91/6	68/-	23½	23½	95/-	−⅛	5 1 0
Vactric (5/-)	4/3	2/-	4	Nil	2/6	—	—
Vickers (10/-)	24/6	14/6	10	10	20/3	−1/-	4 18 9
Ward & Goldstone (5/-) ...	22/6	19/6	20	20	19/9	—	5 1 3
Westinghouse Brake ...	54/9	38/-	17½	10	43/9	—	4 11 5
Walsall Conduits (4/-) ...	31/9	21/3	55	55	26/3	—	8 7 8
West, Allen (5/-)	7/6	5/-	7½	10	7/-	—	7 2 10

* Dividends are paid free of Income Tax.

NEW PATENTS

Electrical Specifications Recently Published

Compiled by a firm of chartered patent agents. The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1938

8193. "Electric arc convertors." Allgemeine Elektricitäts Ges. March 16th, 1937. (518064.)

13857. "Arrangement for tuning an oscillatory electric circuit." L. L. de Kramolin. May 8th, 1937. (Cognate application 13858/38.) (517966.)

14583. "Electro-magnetic switching devices for change-gear." Soc. des Engrenages de Precision Procédés Maag. May 15th, 1937. (Cognate application 14584/38.) (518116.)

17155. "Electric signalling systems for train describing purposes." Standard Telephones & Cables, Ltd., J. B. Griffiths, A. Brown and E. J. Tervet. June 9th, 1938. (517967.)

17531. "Electric-discharge devices." British Thomson-Houston Co., Ltd. July 14th, 1937. (518015.)

17554. "Transformer coupling arrangements." Marconi's Wireless Telegraph Co., Ltd., and C. D. Colchester. June 13th, 1938. (518120.)

17567. "Gas-filled electric incandescent lamps." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. June 12th, 1937. (518016.)

20594. "Electrical control apparatus for regulating the temperature of railways and other vehicles." P. L. Henderson. July 12th, 1938. (517968.)

20701. "Frequency responsive electric relay means." D. R. Price, G. L. Woolnough, and Metropolitan-Vickers Electrical Co., Ltd. July 12th, 1938. (Cognate applications 32451/38, 36828/38 and 14777/39.) (517971.)

21186. "Three-phase current series motors." B. Schwarz. July 16th, 1938. (518124.)

23409. "Direct-current motor equipments." H. Newsham, and Metropolitan-Vickers Electrical Co., Ltd. August 8th, 1938. (518125.)

23555. "Electric remote-control systems." H. List. August 18th, 1937. (517927.)

23586. "Electrical condensers and method for manufacturing the same." Porzellanfabrik Kahla and F. Scheid. August 10th, 1938. (518127.)

23600. "Systems for transmitting high-frequency electric waves." Standard Telephones & Cables, Ltd. September 8th, 1937. (517935.)

23677. "Variable-speed electric motor systems." J. K. Ostrander. August 28th, 1937. (518023.)

23689. "Screened sparking plugs." R. Bosch Ges. September 16th, 1937. (Addition to 482662.) (517939.)

23694. "Wireless receiving system." E. P. Rudkin. August 11th, 1938. (518128.)

23784. "Devices effecting coloured illuminations." A. H. Stott. August 12th, 1938. (517976.)

23836. "Directional antenna arrangements." Standard Telephones & Cables, Ltd., and C. W. Earp. August 12th, 1938. (517982.)

23840. "Electrical plug-and-socket couplings." British Thomson-Houston Co., Ltd., and H. E. Goody. August 12th, 1938. (517983.)

23841. "Gas-blast electric circuit-breakers." British Thomson-Houston Co., Ltd. August 12th, 1937. (517984.)

23849. "Regulating transformer with contact-ring current collector." G. Leischner. August 14th, 1937. (Cognate application 23850/38.) (517987.)

23883. "Electrical insulators," Marconi's Wireless Telegraph Co., Ltd., and H. J. Craymer. August 12th, 1938. (517991.)

23923. "Identification of subscribers in telecommunication exchange systems." Standard Telephones & Cables, Ltd. (W. Hatton and L. Kozma.) August 13th, 1938. (517993.)

23991. "Withdrawable electric switchgear structures." General Electric Co., Ltd., and C. J. O. Garrard. August 15th, 1938. (518087.)

23994. "Electron-discharge devices." Marconi's Wireless Telegraph Co., Ltd. August 13th, 1937. (Addition to 514686.) (518088.)

24002. "Television and like apparatus." Fernseh Akt. Ges. August 14th, 1937. (518090.)

24021. "Electric motors and starting equipment therefor." British Thomson-Houston Co., Ltd., A. H. Maggs and S. U. A. Choudhury. August 15th, 1938. (518093.)

24026. "Sparking-plug protectors." J. O. Hodgkinson. August 15th, 1938. (Addition to 476789.) (518095.)

24039. "Multi-core flexible electric cable connections for rotary mechanical parts." F. Blanche. August 20th, 1937. (518098.)

27353. "Lighting fittings, particularly for electric lights." Co-operative Wholesale Society, Ltd., and R. H. Line. September 20th, 1938. (Addition to 495344.) (518109.)

27494. "Electric furnaces." Birmingham Electric Furnaces, Ltd., and A. G. E. Robiette. September 21st, 1938. (518111.)

27499. "Reflectors for automobile lamps." B. M. Ingles, A. B. Baker and G. R. Ingles. September 21st, 1938. (518112.)

30374. "Battery paste retainers, and methods and apparatus for making the same." United States Rubber Products Inc. October 21st, 1937. (518153.)

1939

8880. "Photo-electric cells." Associated Press. February 10th, 1938. (Divided out of 517607.) (518161.)

TRADE MARK APPLICATIONS

THE following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within a month from the dates given.

February 28th

Brivaron (lettering and design). No. 609702. Class 9 (IV). Dry batteries and thermionic valves.—British Valve & Electrical Accessories Manufacturing Co., Ltd., 324, Liverpool Road, London, N.7.

Autozone. No. 610094. Class 11 (IV). Air purifiers, filters, heaters, deodorisers, conditioners and ventilators.—Philip Alexander, 195, Grove Hall Court, Hall Road, St. John's Wood, London, N.W.8.

March 6th

Moloniser. No. 610113. Class 7 (IV). Air-conditioning and purifying machines.—F. Graucob, Ltd., 70-74, City Road, E.C.1.

Nichronamron. No. 609972. Class 9 (IV). Wire made from alloys of nickel and chromium for electrical purposes.—The Scott Insulated Wire Co., Ltd., Queensland Works, Westmoreland Road, N.W.9.

Ortex. No. 610323. Class 9 (IV). Electric batteries and accumulators.—The Chloride Electrical Storage Co., Ltd., Exide Works, Clifton Junction, Manchester.

Photalix. No. 610285. Class 10 (IV). Shockproof diagnostic shields for use in connection with X-ray apparatus.—Philips Lamps, Ltd., Century House, Shaftesbury Avenue, W.C.2.

Financial Section (*Concluded from page 325*)

steady expansion. Receipts from sales of electricity to their ordinary customers and their associated companies in bulk amounted to £462,011, an increase of over £37,000 and while on the other side rates and taxes had risen they had not increased their tariffs. During the year fifteen miles of distributing mains had been added, bringing the total to 475 miles, and high-voltage mains had been increased by 28½ miles to 643½ miles. Sales to consumers and in bulk reached 108,839,000 kWh, 15 per cent. more than in the previous year, while new connections totalled 2,700. At Wolverton, Stony Stratford and Bletchley they had opened new and larger offices.

Electrical Distribution of Yorkshire, Ltd., reports a revenue for 1939 of £257,955, as against £268,050 in the previous year, from which is deducted interest charges of £17,679 (£14,305), directors' remuneration £2,000 (same) and debenture discount £1,912 (nil), leaving a net balance of £236,364 (£251,745). To this is added £59,838 brought forward, making £296,202. Preference dividends take £46,800 and the ordinary dividend maintained at 9 per cent. (less tax) takes £87,750. Depreciation and reserve is again allotted £100,000 and a balance of £61,652 is carried forward. Sales of electricity rose from 60 million kWh in 1938 to 64.2 million kWh, while the number of consumers connected increased from 116,622 to 127,732. The company's subsidiaries, the Mid-Cumberland Electricity Co. and the Penrith Electric Supply Co., have continued to make satisfactory progress. The report adds that during the year £201,371 was spent on distribution works to meet further demands and advances were made to the Cumberland companies for this purpose.

The Northmet Power Co. held its annual general meeting on Tuesday last, when Sir James Devonshire, deputy chairman, who presided, regretted the absence of Lord Ashfield, chairman of the company, who was indisposed. The secretary, Mr. Evelyn Boys, read Lord Ashfield's speech in which he said that during the first eight months of 1939 their business continued to develop in accordance with the trends which had prevailed for many years. The sales of electricity increased by about 18 per cent. over the corresponding period of 1938, new consumers connected reached 12,349 and prospects seemed favourable. The only disturbing influence was the continuous rise in the price of coal; by August last the average price had increased since 1936 by 44 per cent. With the coming of war, however, they experienced a fall in the total demand for electricity of 20 to 25 per cent., and, in consequence, over the whole twelve months of 1939 the actual increase was less than 10 per cent. It followed that the financial result for the last four months was in sharp contrast to that for the first eight months and the margin between revenue and expenditure diminished.

In referring to the accounts, Lord Ashfield mentioned the transfer to and vesting in their company of the electricity undertaking of the Hendon Electric Supply Co. and the sale of the Willesden generating station to their subsidiary, the North Metropolitan Power Station Co. and the leasing back of the station to the Northmet Power Co., under an arrangement similar to that entered into with respect to the Brimsdown generating station. In view of the anticipated drop in consumption during the current year and the rising prices of material, it had been decided that the rates of charges to all consumers who were not supplied under agreements which contained a coal clause should be increased by 12½ per cent. in respect of electricity consumed as from the meter readings taken on, or after, March 1st, 1940. With regard to their subsidiaries, Lord Ashfield referred to the North Metropolitan Power Station Co. and said that the reconstructed Brimsdown "A" station had been on commercial load throughout the year and much of the building work in connection with the extension of the Brimsdown "B" station had been completed. The results of the Bishops Stortford, Epping and District Gas Co. for the past year had been satisfactory.

CONTRACT INFORMATION

Particulars of work for which tenders are invited, contracts placed, and building schemes promising work for electrical contractors and traders

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses. Further details of items marked with an asterisk can be obtained from the Department of Overseas Trade (Inquiry Room), Great George Street, London, S.W.1.

Argentina.—April 17th. State Oilfields Department. Electric crane with a maximum loading capacity of 10,000 kilos. (T. 17018/40.)

Atherton.—March 19th. U.D.C. Cast-iron concentric cable service boxes, and house service type quarterly and prepayment meters. Electrical engineer, Electricity Department, Factory Street.

Australia.—BRISBANE.—April 16th. City Electric Light Co. 44-, 33- and 11-kV metal-clad switchgear. (T. 16129/40.)*

MELBOURNE.—April 30th. State Electricity Commission of Victoria. Two 66-kV transformers and one voltage and phase angle regulating equipment. (T.Y. 16494/40.)*

Birmingham.—March 20th. Electricity Supply Department. Cast-iron circulating water pipework and associated valves, &c., required in connection with the new condensing plant at Hams Hall "B" power station. (See this issue.)

Bury.—March 19th. Electricity Department. 6,600-V switchgear and four 750-kVA transformers. (March 8th.)

Eire. — ROSCOMMON. — March 29th. County Board of Health and Public Assistance. Pumps, motors, and float controlled automatic stopping and starting gear. J. Kilmartin, Board of Health Office (deposit £2 2s.).

Hastings.—April 8th. Electricity Department. April 8th. Two 200-kVA transformers. (See this issue.)

Hexham.—R.D.C. Electrical installations in 18 houses at Haydon Bridge. Plans by the surveyor, Council Offices, Hexham.

India.—NEW DELHI.—April 4th. Stores Department. Wall plugs and ceiling roses. (T. 16398/40.)*

April 9th. One 1,500-kVA, 3.3/11-33-kV power transformer and arc suppression coil for Bezwada scheme. Specification E.132 (Rs.10) from the Executive Engineer, Electrical and Mechanical Division, Chepauk.

Kilmarnock. — March 18th. Town Council. Supply of electric lamps for all the Corporation Departments during the year commencing May 16th, 1940. Particulars and forms from Burgh Surveyor's Office, 17, Green Street, Kilmarnock.

London. — COMMISSIONERS OF H.M. WORKS.—March 21st. Electrical wiring installation in the West Midlands Area. (March 8th.)

March 29th. Three large electric wiring installations in the West of England. (March 8th.)

Manchester.—March 18th. Electricity Department. Supply of street-lighting fittings. H. C. Lamb, Electricity Department, Town Hall, Manchester, 2.

March 20th. Electricity Committee. Cables and service cut-outs for one year. (March 8th.)

New Zealand. — WELLINGTON.—Public Works Department. May 14th. Control and relay panels. (T. 16070/40.)*

May 21st. Control and relay panels. (T. 16069/40.)*

May 21st. Public Works and Tenders Committee. Control and relay panels for Mt. Roskill substation, Auckland. (T. 16068/40.)*

Prestwich.—March 16th. Town Council. 300 modified street lighting fittings to be installed on existing standards. Borough engineer, Town Hall.

Salford.—March 20th. Corporation. One 100/150-A mercury-arc rectifier. (See this issue.)

South Africa. — JOHANNESBURG.—April 10th. City Municipal Council. 1,600 sets of insulated type house service cut-outs and 288 spare fuses. (T. 16812/40.)*

April 22nd. Railways and Harbours Administration. 15-ton electrically driven Goliath crane. (T. 16786/40.)*

Insulated wire, flexible cable and cab-tyre flex. (T. 16813/40.)*

PORT ELIZABETH.—April 25th. Municipality. Four 4,000-kVA, three-phase transformers. (T.Y. 16809/40.)*

South Shields.—Town Council. Electrical rewiring of the municipal baths and wash-houses. Borough electrical engineer.

Straits Settlements.—SINGAPORE.—May 27th. Municipal Water Department. Electrically driven main supply and wash water pumping sets. (T.Y. 16797/40.)*

Walsall.—March 28th. Electricity Department. Eight 400-kVA and one 500-kVA transformers. (March 8th.)

West Midlands. — J.E.A. April 5th. Supply, delivery and erection of 33-kV switchgear and 33/11-kV step-down transformers. (See this issue.)

Weymouth and Melcombe Regis.—April 2nd. Electricity Department. Transformers. (See this issue.)

Orders Placed

Birmingham.—Electric Supply Committee. Tenders accepted during period October 6th, 1939, to January 19th, 1940:—Meters.—Landis & Gyr; Aron Electricity Meter. Switchgear at Perry Barr substation.—George Ellison. Cable protective covers for twelve months ending October 31st, 1940.—H. J. Baldwin & Co. Transformers.—Electric Construction Co.; British Thomson-Houston Co. Two electrically operated overhead travelling cranes at Hams Hall "B" power station.—Vaughan Crane Co.

Bradford.—Electricity Committee. Recommended. Two electrically operated valves for circulating water pipes at Valley power station.—J. Blakeborough & Co.

Transport Committee. Recommended. One trolley-bus (£2,455).—Karrier Motors.

Great Yarmouth.—Electricity Committee. Accepted. Coils and accessories for protection in rural areas (£380).—A.E.G. Electric Co.

Huddersfield.—The maintenance contract of Etchells, Congdon and Muir, Ltd., for the passenger lift in High Street Building is to be renewed for a further twelve months from March 31st.

Leeds.—Electricity Committee. Accepted. Substation switchgear for twelve months.—English Electric Co. Two-phase switchgear (£1,322).—Yorkshire Switchgear & Engineering Co. Lift at Kirkstall power station (£750).—Rawlinsons, Ltd. Pipework (£1,215).—Aiton & Co. Suction ash plant (£1,290), dust plant (£695) and temperature recorders (£535).—International Combustion.

Liverpool. — Town Council. Recommended. X-ray transformer for the Mill Road Infirmary (£575).—Watson & Sons (Electro-Medical), Ltd.

London.—LEWISHAM.—Emergency Committee. Recommended. Installation of electric lighting at public shelters.—Brown Bros. (£2,011).

Middlesex.—Health Committee. Electrical installation at Hillingdon Hospital extensions:—

	£
Thorpe & Thorpe. Recommended	**1,117**
Colston Electrical Co.	1,149
T. Clarke & Co.	1,164
F. Troy & Co.	1,201
Middlesex Electrical Co.	1,446

Plymouth.—Electricity Committee. Accepted. Meters.—Aron Electricity Meter; Ferranti; Venner Time Switches. Time switches (general use and street lighting).—Venner Time Switches.

Pontefract.—Water Committee. Accepted. Installation of an electrically driven borehole pump at Roall waterworks (£1,397).—Hathorn Davey & Co.

Salford. — Town Council. Accepted. Electric lighting work in connection with a new school at Lancaster Road, Pendleton.—H. C. Taylor & Co.

Scarborough. — Town Council. Accepted. Medium-voltage switchboards.—Metropolitan-Vickers Elecl. Co. (£500); English Electric Co. (£233).

Sheffield.—Town Council. Accepted. X-ray apparatus (£582).—Victor X-Ray Corporation.

Swindon.—Electricity Committee. Recommended. Switchgear re-rating as recommended by Messrs. Preece, Cardew & Rider (£22,715).—British Thomson-Houston Co.

Wimbledon. — Electricity Committee. Recommended. Extension of contract for cables for twelve months.—Britannic Electric Cable Co.

Workington. — Electricity Committee. Recommended. Feeder cable from Oxford Street substation to Northside substation.—British Insulated Cables.

Wolverhampton.—Electricity Committee. Recommended. Switchgear for Bushbury substation.—British Thomson-Houston Co. (£58,277). Switchgear.—Ferguson, Pailin (£1,580); A. Reyrolle & Co. (£1,580); General Electric Co. (£2,600). For twelve months: Transformers.—Electric Construction Co. P.i. cables, tapes and compound. — Callender's. Metal-clad switchgear.—Reyrolle. Cubicle type switchgear. — Ferguson, Pailin. House service cut-outs.—Revo.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Amersham.—Fire stations at Amersham and Buckland Common, for R.D.C.; surveyor, Council Offices.

Barnes.—R.C. church (£9,000), Castelnau, for St. Osmund's; A. Hodsdon, architect, Quainton, Harford Drive, Watford.

Barnsley.—Pithead baths at Wentworth Silkstone Colliery; Miners' Welfare Central Fund Committee, Romney House, Tufton Street, London, S.W.1.

Birmingham. — Factory, Bradford Street; W. C. Skinner & Co., builders, Birchfield Road, Birmingham.

Additions to the George Dixon Schools, City Road; B. Whitehouse & Sons, builders, Monument Road, Birmingham.

Additions to the Hastings Road Schools, Perry Common; Morris, Jacombs & Sons, builders, Hobmoor Lane, Birmingham.

Additions to the Linden Road Schools, B. Whitehouse & Sons, builders, Monument Road, Birmingham.

Additions to works of Higgs Motors, Ltd., Witton; P. W. Cox, Ltd., builders, Grove Lane, Birmingham.

Bootle.—Extensions to police buildings; borough engineer.

Bournemouth. — Hotel, Wimborne Road; T. Schofield.

Bradford.—Canteen, Lower Lane; Hepworth & Grandage, Ltd.

Brandon (Co. DURHAM).—Houses (104); U.D.C. surveyor.

Bristol.—Dwellings, Snowdon Road (£11,150); city engineer.

Bromsgrove.—Factory in Stourbridge Road; C. Bryant & Sons, builders, Whitmore Road, Birmingham.

Cardiganshire. — Isolation hospital (£30,000). Tanybwich; county architect, County Hall, Aberayron.

Carlisle.—Junior school, Harraby housing estate (£6,500); city surveyor.

Clacton-on-Sea. — Three-storey office block for F. W. Llewellyn & Co., Ltd.; E. Robins Nixey, architect, Lloyds Bank Chambers.

F

*

Clitheroe. — Mill extensions, Little Moor; R. D. Blackburn & Sons.

Coventry.—Licensed premises, corner of Sheriff Avenue and Templars Fields, for Atkinson's Brewery, Ltd., Little Park Street, Coventry.

Shops and houses, Belgrave Road, for T. Dalton & Co., Wyken, Walsgrave-on-Sea.

Shops, Corporation Street and Bablake Street, for E. Batley.

Diss.—Factory, for Syleham Clothing Co., Syleham Mills.

Dudley.—Rebuilding the Britannia Inn, 96, Hall Street, for Fredk. Smith, Ltd., Model Brewery, Lichfield Road, Aston, Birmingham.

Durham.—Pithead baths at Ouston Colliery; S. Miller, contractor, 17, North Street, Newcastle.

Eccles.—Extensions for Hill & Hiley, Ltd., Monton Fields Road; H. S. Fairhurst & Son, architects, 55, Brown Street, Manchester.

Edinburgh.—Extensions to premises for Young Bros., The Pleasance.

Glasgow.—Extensions for Dalsholm Paper Co., Ltd., Maryhill.

Greenock.—Extensions (80 beds), at Sailors 'Rest, for British Sailors Society.

Great Yarmouth. — Clinic, Infirmary grounds; borough engineer.

Groesfaen (SOUTH WALES).—Pithead baths (1,400 men); Miners' Welfare Commission, Romney House, Tufton Street, S.W.1.

Halesowen.—Extensions to works for A. J. Emery & Sons, Whitehall Road.

Halifax.—Offices, stores, &c. (£5,630), Gaol Lane; borough engineer.

Hemsworth.—Factory, Fitzwilliam, for Blakey's Boot Protectors, Ltd., Armley, Leeds, 12.

Hereford.—Emergency Hospital, Union Walk; Buckland & Haywood, architects, Norwich Union Chambers, Congreve Street, Birmingham.

Higham Ferrers.—Extensions to factory, Midland Road, for Victoria Leather Co., Ltd.

Hinckley. — Warehouse extensions, High Street, Earl Shildon; A. G. Menaid & Son.

Lancaster.—New factory, for Storey Bros. & Co., Ltd.

Leatherhead. — Stores, 20-22, High Street, for F. W. Woolworth & Co., Ltd.

Leeds.—Pithead baths at Allerton Bywater Colliery; R. Walker & Sons, Ltd., contractors, Cambridge Street, Castleford.

Lindsey.—Police headquarters scheme at Scunthorpe (£50,000); county architect, County Offices, Newland, Lincoln.

London.—BERMONDSEY.—Welfare Centre (£16,890), site at Rotherhithe New Road; borough engineer.

SOUTH NORWOOD.—Extensions to St. George's Works, Merton Road, for Vacuum Science Products, Ltd., 166, Wen Road, S.E.13.

DEPTFORD.—Showroom and offices, 213-223, Lewisham Way; Braxton, Sinclair & Barton, 25, Whitehall, S.W.1.

Malton.—Emergency hospital, Norton Grove, for U.D.C.; surveyor, Market Place, Malton.

Mansfield.—Rebuilding shops and the Olde Eclipse Inn, Westgate, for Mansfield Brewery Co., Ltd.; Warner and Dean, architects, Sutton-in-Ashfield.

Additions to factory, for Mower and Sons, Lumley House; F. W. Tempest, architect, Regent Street.

Shoe factory extension, Dallas Street, for Mansfield Shoe Co., Ltd.; Cook, Howard and Lane, architects, Leeming Street, Mansfield.

Marston Green.—Factory, Bickenhill Lane, Marston Green; Wilson, Lovatt & Sons, builders, Clarence Road, Wolverhampton.

Merthyr Tydfil.—Completion of 212 houses, for Housing Committee; Edward Roberts, town clerk.

Morpeth.—Hotel, Stobhill Gate estate; S. H. Lawson, Emerson Chambers, Newcastle-on-Tyne.

Motherwell.—Building at Clyde Alloy Steel Company's Works to be used as heat treatment shop and bar mill; the manager.

Newcastle-on-Tyne. — Emergency hospital for the City Council (£900); E. Thompson, builder, 12, Grey Street, Newcastle-on-Tyne.

Extensive alterations to the Stack Hotel (£4,000); Newcastle Hotels, Ltd., 7, Eldon Square, Newcastle-on-Tyne.

Newport (MON).—Additions to the Durham Road Boys' School; borough architect, Town Hall, Newport, Mon.

Northampton.—Houses for agricultural workers; R.D.C. surveyor, Council Offices.

Extensions to mills for Willett & Bartram, Flax Mills, Billing, Northampton; Frank H. Allen, architect, 24, Albion Place, Northampton.

Portsmouth.—Extensions to factory for J. Palmer, Ltd., Cornwall Road; H. J. Dyer & Sons, architects, Victoria Road, Southsea.

Redditch.—Factory in Studley Road; C. Bryant & Sons, builders, Whitmore Road, Birmingham.

Rothbury.—Rebuilding Jubilee Hall; C. F. Murphy, architect, Newgate Street, Morpeth.

Salford.—Extensions to works for Greengate & Irwell Rubber Co., Greengate.

Sheffield. — Warehouse, Buchanan Road and Lytton Road, for J. Shentall, Ltd., Whittington Moor, Chesterfield; W. A. Derbyshire, architect, Gluman Gate, Chesterfield.

Extensions to works for Howell & Co., Ltd., Meadowhall Road.

Works additions, Corby Street; Spear & Jackson, Ltd.

Southall.—Shops, South Road; Oak Property Co., Ltd.

South Shields.—Hotel, Harton Lane, for J. Rowell and Co.; G. E. Gibson, architect, 144a, New Bridge Street, Newcastle-on-Tyne.

Stechford.—Schools; Percy W. Cox, Ltd., builders, Grove Lane, Birmingham.

Stoke-on-Trent.—Health clinic, Cooke Street and Edensor Road, Longton, for T.C.; borough engineer.

Dwellings; J. Clarke, architect, 28, Market Place, Burslem, Stoke-on-Trent.

Stretford.—Works extensions, Chester Road; Veno Drug Co., Ltd.

Canteen, Trafford Park Road; Staff Caterers, Ltd.

Sunderland. — Alterations to paper works for Hendon Paper Co., and erection of spirit polish store for Robinson (Sunderland), Ltd.; W. and T. R. Milburn, architects, 17, Fawcett Street, Sunderland.

Tripe factory, Winchester Terrace, for H. Turley, Ltd.; Matkin and Hawkins, architects, Fawcett Street, Sunderland.

Swinton.—Additions to works for yarn store, Victoria Lane, Moorside, for Holdsworth & Gibbs, Ltd., doublers & spinners, Moorside Mills; C. Musker & Bros., Ltd., contractors, Bingham Street, Swinton, Manchester.

Teddington.—Additions, Tensile Works, Twickenham Road; Gordon, Carrington Co., Ltd.

Walsall.—Schools, Great Barr; P. W. Cox., Ltd., builders, Grove Lane, Birmingham.

Hotel at the corner of Station Street and Park Street, for Messrs. Ansells Brewery, Ltd., Aston, Birmingham.

Walthamstow. — Factory extensions, Lea Bridge; A. Savill & Sons, architects, 51a, Lincoln's Inn Fields, London, W.C.2.

Washington (Co. DURHAM).—Completion of houses (84), at The Drive, for the U.D.C.; H. Riley, builder, Wellbank Road, Washington.

Wellingborough.—Extensions to premises, Midland Road, for Wellingborough Co-operative Society, Ltd.

West Bromwich.—Additions to premises of Salters & Co., High Street, West Bromwich; C. Bryant & Sons, builders, Whitmore Road, Birmingham.

West Riding.—Provision of air-raid shelters at children's homes at Hemsworth, Chapeltown, and Keighley and Goole Institution, for the C.C.; county architect, County Hall, Wakefield.

Whitehaven (CUMBERLAND).—Completion of 300 houses on the Hensingham housing site; A. Wilson, borough engineer and surveyor, Town Hall.

Wolverhampton. — Farm buildings, Pendeford estate (£2,000); borough engineer.

Factory, Stafford Road; H. Willcock & Co.

Factory extension, Monmore Green; E. P. Jenks, Ltd.

Workington.—Factory, Siddick; Thermal Syndicate, Ltd.

Wrexham.—Flats, Whitegate and Gatefield estates; borough engineer.

FORTHCOMING EVENTS

Institution of Electrical Engineers (*Meter & Instrument Section*).—Friday, March 15th. Institution, London, W.C.2. 6 p.m. Informal meeting. Discussions on "Cathode-ray and Duddell Type Oscillographs—Advantages and Disadvantages for Audio-frequencies." To be opened by Professor J. T. MacGregor-Morris. "What are the Practical Limits of Error in AC House Service Meters and in Sub-standard Watt Meters?" To be opened by A. J. Pitt.

Mersey and North Wales (*Liverpool*) *Centre.*—Monday, March 18th. Quaintways Café, Chester. 6.15 p.m. E.R.A. report on "The Performance of Glass Insulators and Comparisons with Porcelain." By C. E. R. Bruce and Dr. S. Whitehead. "The Development of a Pre-stressed ('Toughened') Glass Insulator." By P. M. Hogg. (Joint meeting with the Chester Engineering Society.)

North-Western Centre. — Tuesday, March 19th. Engineers' Club, Manchester. 6.45 p.m. "Operating Experience with High-Voltage Alternators." By W. D. Horsley.

Northern Ireland Sub-Centre.—Tuesday, March 19th. 9, Wellington Place, Belfast. 6 p.m. Informal discussion.

Western Centre. — Tuesday, March 19th. South Wales Institute of Engineers, Cardiff. 3.15 p.m. Thirteenth William Menelaus Memorial Lecture. "Electricity as Applied to Metallurgy." By Dr. A. P. M. Fleming. (Joint meeting with the South Wales Institute of Engineers.)

Sheffield Sub-Centre. — Wednesday, March 20th. King's Head Hotel, Sheffield. 6 p.m. Discussion on "Electrical Testing of Steels."

Irish Centre.—Thursday, March 21st. Trinity College, Dublin. 6 p.m. Particulars to be announced.

South Midland Students' Section.—Monday, March 18th. Kunzles' Café, Union Street, Birmingham. 7 p.m. "The Choice of Protection for High-voltage Systems." By J. Harris and D. Stephens.

Physical Society. — Tuesday, March 19th. Mathematics and Physics Department of the Polytechnic, Regent Street, London, W.1. 5.30 p.m. Joint meeting with the Plastics Group of the Society of Chemical Industry. Discussion on the electrical and general physical properties of plastics. The opening paper will be "The Dielectric Behaviour of Some Thermoplastics," by L. Hartshorn, D.Sc., N. J. L. Megson, M.Sc., and E. Rushton, B.Sc.

Institution of Engineers-in-Charge.—April 19th. 6 for 6.30 p.m. Holborn Restaurant. Annual dinner.

Institute of Marine Engineers.—Friday, March 15th. Connaught Rooms, London, W.C.2. 12 noon. Annual general meeting. 1 for 1.15 p.m. Luncheon. Sir Percy E. Bates, president, will preside.

Association of Mining Electrical Engineers (*London Branch*). — Saturday, March 16th. 10.45 a.m. Joint visit with the Kent Sub-Branch of the Association to Maidstone, where the Power Station will be inspected.

Junior Institution of Engineers (*Midland Section*).—Saturday, March 16th. James Watt Institute, Birmingham. 2.30 p.m. "Industrial Power and Heating." By R. L. Kirlew.

Electrical Power Engineers' Association (*London Technical Group*).—Tuesday, March 19th. Caxton Hall, Westminster. 6 p.m. "Electrical Conductors." By Dr. Dannett.